JPRS-UEE-86-005

13 AUGUST 1986

USSR Report

ELECTRONICS AND ELECTRICAL ENGINEERING

FBIS FOREIGN BROADCAST INFORMATION SERVICE

NOTE

JPRS publications contain information primarily from foreign newspapers, periodicals and books, but also from news agency transmissions and broadcasts. Materials from foreign-language sources are translated; those from English-language sources are transcribed or reprinted, with the original phrasing and other characteristics retained.

Headlines, editorial reports, and material enclosed in brackets [] are supplied by JPRS. Processing indicators such as [Text] or [Excerpt] in the first line of each item, or following the last line of a brief, indicate how the original information was processed. Where no processing indicator is given, the information was summarized or extracted.

Unfamiliar names rendered phonetically or transliterated are enclosed in parentheses. Words or names preceded by a question mark and enclosed in parentheses were not clear in the original but have been supplied as appropriate in context. Other unattributed parenthetical notes within the body of an item originate with the source. Times within items are as given by source.

The contents of this publication in no way represent the policies, views or attitudes of the U.S. Government.

PROCUREMENT OF PUBLICATIONS

JPRS publications may be ordered from the National Technical Information Service (NTIS), Springfield, Virginia 22161. In ordering, it is recommended that the JPRS number, title, date and author, if applicable, of publication be cited.

Current JPRS publications are announced in Government Reports Announcements issued semimonthly by the NTIS, and are listed in the Monthly Catalog of U.S. Government Publications issued by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

Correspondence pertaining to matters other than procurement may be addressed to Joint Publications Research Service, 1000 North Glebe Road, Arlington, Virginia 22201.

JPRS-UEE-86-005
13 AUGUST 1986

USSR REPORT
ELECTRONICS AND ELECTRICAL ENGINEERING

CONTENTS

CIRCUITS & SYSTEMS

COMMUNICATIONS

SOLID STATE CIRCUITS

SONICS & ULTRASONICS

TRANSPORTATION

NEW ACTIVITIES, MISCELLANEOUS

UDC 621.396.933:527.61:629.783:525

INTEGRATED COMPENSATION SYSTEM FOR NAVSTAR RADIO NAVIGATION SYSTEM COMPUTER

Leningrad IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: PRIBOROSTROYENIYE in Russian Vol 28, No 7, Jul 85 (manuscript received 11 May 84) pp 33-38

N. V. Makarova and A. A. Ignatov, Leningrad Institute of Control Methods and Techniques

[Abstract] This article investigates the potential accuracy of an integrated compensation system for the NAVSTAR stand-alone computer that incorporates a velocity sensor, a heading system, and a radio navigation system. The information from these sensors is input to a special purpose computer that calculates the coordinates of the mobile platform and the coordinates of one of the satellites, and then determines the range from the platform to that satellite. The algorithm for processing the data from the primary sensors is described. The potential parameter measurement accuracy is modeled for two, three, and four satellite ranging channels. It is found that the velocity and heading error is reduced the most when four range channels are used. This effect requires that at least three satellites be in view at all times. Figures 4; references: 5 Russian.
[6900/156]

UDC 629.78.05

ELECTROMAGNETIC RETARDATION OF ROTATION OF SPACECRAFT

Novocherkassk IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: ELEKTROMEKHANIKA in Russian No 10, Oct 85 (manuscript received 20 Oct 83) pp 113-117

Ye. M. Potapenko

[Abstract] An analysis is made of electromagnetic braking of a spacecraft, such as that occurring after the spacecraft separates from the carrier rocket, and under certain emergency conditions. The task of electromagnetic braking is to convert the rotation of the orbiting spacecraft with respect to the orbital coordinate system to a gravitation-oriented position in which the

axis of the least moment of inertia of the spacecraft is permanently directed toward the center of the earth. The gravitational moment of the spacecraft and the constraints on the magnetic moment of the electromagnets are taken into account by modeling the motion of the spacecraft. The findings indicate that an algorithm proposed previously by the author for forming the magnetic moments provides good orientation accuracy in the steady-state mode, as well as effective suppression of large angular velocities and reliable transition to the gravitational-orientation mode. Figures 1; references: 3 Russian.
[6900/153]

UDC 681.883.67.019.4

NOISE TOLERANCE OF PLANE ANTENNAS IN ANISOTROPIC INTERFERENCE FIELD

Moscow AKUSTICHESKIY ZHURNAL in Russian Vol 31, No 4, Jul-Aug 85 (manuscript received 5 Jan 84) pp 502-506

M. D. Smaryshev and Ye. L. Shenderov

[Abstract] This study investigates the noise tolerance of plane antennas consisting of different combinations of monopole and dipole receivers in a far anisotropic interference field considering possible differences in the directivity characteristics of the receiving elements. It is found that the noise tolerance is somewhat better for more applicable processing than for an antenna consisting of monopoles alone. However, the noise tolerance of a multiplicative antenna is always poorer than that of the same antenna consisting of monopole receivers lying in the hard or soft infinite planes of the screens. The difference in the tolerance of all of the antennas examined is smaller than 5 dB, increasing to 7 dB for a dipole receiver with $H/\lambda \ll 1$ and clearly defined anisotropy. Figures 5; references 7: 1 Russian, 6 Western.
[6900/149]

UDC 534.232

NEAR-ZONE RESPONSE OF HORIZONTAL ANTENNA

Moscow AKUSTICHESKIY ZHURNAL in Russian Vol 31, No 4, Jul-Aug 85 (manuscript received 29 Nov 83) pp 507-510

I. Ye. Shchekin

[Abstract] The near-zone directional properties of a focused equidistant horizontal antenna in a homogeneous layer of water bounded from above by a free surface and from below by a solid bottom is investigated. The acoustic field in the layer is created by an omnidirectional point source that emits an audio signal. By changing the position of the acoustic source in the water layer, and accordingly the type of phase compensation, it is possible

to reproduce and measure the directivity of equidistant horizontal antennas, which is characterized by their response, in the near-zone. Figures 4; references 5: 3 Russian, 2 Western.
[6900/149]

UDC 537.874.6.01

DIFFRACTION OF PLANE ELECTROMAGNETIC WAVE BY LATTICE OF ROUND DIELECTRIC BARS

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 30, No 10, Oct 85 (manuscript received 13 Oct 83) pp 1879-1884

F. G. Bogdanov, G. Sh. Kevanishvili, Z. I. Sikmashvili and O.P. Tsagareyshvili

[Abstract] The problem of diffraction of a plane electromagnetic wave on a periodic lattice of round dielectric bars is solved by projection cross-linking; the basic diffraction characteristics of the lattice are analyzed as a function of the parameters of the problem for E- and H-polarizations of the incident wave. A theory of lattices of round bars is developed. A system of algebraic equations is derived for the unknowns to find the internal and external diffraction fields. It is found that the diffraction behavior of the lattice in question is qualitatively the same for E- and H-polarizations of the incident wave. The lattice of dielectric elements manifests resonant properties in relation to change of all of the parameters of the problem. The structure of the re-radiated field is found to change significantly as the relative permittivity of the cylinder material changes. The findings can be used in antenna engineering and other areas of microwave engineering. Figures 4; tables 1; references: 2 Russian.
[6900/136]

UDC 621.396.67.001.5

DIRECTIONAL PROPERTIES OF ANTENNA IN TURBULENT ATMOSPHERE WITH SHORT-TERM AVERAGING. ENERGY CHARACTERISTICS OF RADIATION PATTERNS

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 30, No 10, Oct 85 (manuscript received 28 May 84) pp 1901-1907

A. G. Vinogradov and Z. I. Feyzulin

[Abstract] The energy characteristics of the radiation pattern of an antenna in a turbulent medium are investigated by a method developed elsewhere by the authors for describing the directional properties of a linear receiving antenna based on determining the positions of the extremal points of a random pattern and finding its basic geometric characteristics. The energy characteristics calculated include the average pattern value at the instantaneous maximum, the average directional gain, the total normalized power contained in the center lobe, and the pattern values at the extremal points. It is found

that the random radiation pattern maintains the same overall structure as an unperturbed pattern even with fairly strong face fluctuations. Normalized instantaneous average patterns are calculated and plotted, indicating that the instantaneous average pattern describes the behavior of the random pattern better than the average pattern. Figures 2; tables 1; references: 3 Russian. [6900/136]

UDC 621.396.677.01

GENERATORS OF DUAL-REFLECTOR ANTENNAS

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 30, No 10, Oct 85 (manuscript received 23 Apr 84) pp 1914-1918

V. K. Bodulinskiy, B. Ye. Kinber and V. I. Romanova

[Abstract] Simple solutions are found for explicit formulas derived earlier by one of the authors for the generating surfaces of two reflectors (two-dimensional and asymmetrical) that transform a cylindrical or spherical primary wave to a plane wave with the required amplitude transformation. The correspondence between the beams of the primary wave and the beams of the plane wave, which governs the form of the generators of the reflectors, is assigned. The formulas derived, which contain only single integrals of that mapping, are verified for transformation of one beam of a plane wave to another beam of a plane wave and transformation of a spherical wave to a plane wave. Figures 2; references 5: 4 Russian, 1 Western.
[6900/136]

UDC 621.396.677.83.53.089.5

REALIZATION OF DIRECTIVITY CHARACTERISTICS WITH MINIMUM SIDE RADIATION LEVEL IN SINGLE-REFLECTOR ANTENNA SYSTEMS

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 30, No 10, Oct 85 (manuscript received 15 Mar 84) pp 2056-2057

V. G. Panchenko

[Abstract] The realization of directivity characteristics with minimum side radiation level in single-reflector antenna systems by employing smooth field distributions in the aperture is investigated. Dipole radiators are proposed that can be used to build single-reflector antenna systems with minimal main beam width for any given side lobe level by using the optimal aperture angle. For example, if the level of the first side lobe is specified at -27 dB, the optimal aperture angle is close to 60°; an aperture angle of approximately 80° is required to realize a side lobe level of -43 dB. Figures 3; references 4: 3 Russian, 1 Western.
[6900-136]

UDC 621.396.677.75:621.318.134

INDUCTANCE OF FERRITE-CORE LOOP ANTENNA

Moscow ELEKTROSVYAZ in Russian No 11, Nov 85 (manuscript received 21 Jan 85) pp 54-56

A. F. Mikheyev

[Abstract] The change in the inductance of a ferrite-core loop antenna as the length of the winding in the middle of the core is increased is analyzed theoretically. The relationship between the equivalent magnetic permeability of the coil is found as a function of the ratio of the length of the coil to the length of the core; the ratio of the effective magnetic permeabilities of the coil (winding) and the ferrite-core are found as a function of the same ratio. The calculated and experimental data agree satisfactorily. Figures 3; references: 4 Russian.
[6900/155]

UDC 621.317.743.7

USE OF PARAMETRIC ESTIMATION IN DETERMINING ANTENNA DIRECTIVITY PATTERNS USING WEAK RADIO SOURCES

Gorkiy IZVESTIYA VYSSHIKH UCHENNYKH ZAVEDENIY RADIOFIZIKA in Russian Vol 28, No 11, Nov 85 (manuscript received 5 Jul 84 after revision) pp 1351-1356

L. A. Pasmanik, V. I. Turchin and V. A. Ugrinovskiy, Scientific Research Radio Physics Institute

[Abstract] The use of optimal parametric estimation procedures to find the required parameters of the main lobe of the directivity pattern of radio astronomy antennas is proposed. The numerical parameters characterizing the main lobe are estimated directly by the least-squares method. The method was tested on an axis symmetrical reflector antenna 7 m in diameter at a width length of 6 cm using measurements from radio source 3S 461 using a PK7-11 receiver. The values obtained agreed basically with those calculated. Figures 2; references 8: 6 Russian, 2 Western.
[6900/163]

UDC 621.385.6

INVESTIGATION OF FINE STRUCTURE OF DIFFRACTION RADIATION IN MILLIMETER BAND. II

Gorkiy IZVESTIYA VYSSHIKH UCHENNYKH ZAVEDENIY RADIOFIZIKA in Russian Vol 28, No 11, Nov 85 (manuscript received 7 Aug 84) pp 1443-1449

A. A. Vertiy, I. V. Ivanchenko, A. V. Nesterenko, N. A. Popenko, A. I. Tsvyk, L. I. Tsvyk and V. P. Shestopalov, Institute of Radio Physics and Electronics, Ukrainian SSR Academy of Sciences

[Abstract] The mechanisms occurring in real nonrelativistic electron streams are investigated experimentally by the characteristics of diffraction radiation using quasioptical polarimetry. The characteristics of excitation of diffraction radiation by a stream of electrons is investigated, and the polarization characteristics of diffraction radiation are analyzed. Diffraction radiation excited by slow and fast space-charge electron waves, as well as slow and fast synchronous electron waves, is investigated. Spatial resolution of the directivity patterns of diffraction radiation is shown possible when longitudinal and transverse waves are excited simultaneously in a modulated electron stream. The findings open up new possibilities for investigating electron-wave processes in electron beams, as well as creating highly coherent parametric diffraction electronic devices. Figures 6; references: 5 Russian.
[6900/163]

UDC 550.388.2

POSSIBILITY OF DETERMINING VERTICAL MOVEMENTS IN IONOSPHERE FROM DOPPLER VERTICAL SOUNDING RECORDINGS BASED ON VOLTERRA'S INTEGRAL EQUATION

Gorkiy IZVESTIYA VYSSHIKH UCHENNYKH ZAVEDENIY RADIOFIZIKA in Russian Vol 28, No 11, Nov 85 (manuscript received 27 Jun 84) pp 1470-1472

P. F. Denisenko and L. A. Ivanukin, Rostov-on-Don State University

[Abstract] The possibility of determining movements in the ionosphere from Doppler recordings obtained by vertical sounding is investigated. It is shown that the inverse problem of determining the time variability of the electron concentration from Doppler recordings can be reduced to solving Volterra's integral equation for the approximation of a non-absorbing planar stratified ionosphere. References: 4 Russian.
[6900/163]

UDC 517.25:517.9

STATISTICAL PROPERTIES OF LORENZ MODEL

Gorkiy IZVESTIYA VYSSHIKH UCHENNYKH ZAVEDENIY RADIOFIZIKA in Russian Vol 28, No 11, Nov 85 (manuscript received 24 Apr 85) pp 1472-1473

L. A. Bunimovich, Institute of Oceanography, USSR Academy of Sciences

[Abstract] The statistical properties of the Lorenz model that are substantive from the viewpoint of physical applications are investigated. Trajectory statistics throughout the entire region of attraction of the Lorenz attractor are investigated for a full three-dimensional Lorenz system. The magnitude of the fluctuations of the time average phase functions and the rate at which the time correlations attenuate in the system are studied. It is found that investigation of the rate at which the correlations drop off requires theoretical research to determine the analytical form of the asymptote of the correlation functions. References: 5 Russian.
[6900/163]

UDC 551.510.536

GENERATION OF ACOUSTIC-GRAVITY WAVES BY ATMOSPHERIC TURBULENCE

Gorkiy IZVESTIYA VYSSHIKH UCHENNYKH ZAVEDENIY RADIOFIZIKA in Russian Vol 28, No 11, Nov 85 (manuscript received 11 Jun 84) pp 1357-1365

I. N. Drobyazko and V. N. Krasilnikov, Leningrad State University

[Abstract] Employing Lighthill's method, the authors examine the acoustic-gravity wave field generated by turbulent movements in the atmosphere. The turbulent source is related with a cyclonic eddy of limited dimensions and is described through the statistical theory of turbulence. It is found that major atmospheric storms can generate high frequency gravity waves with intensity significantly exceeding the atmospheric noise level. The results indicate that atmospheric turbulence plays a significant role in a number of other acoustic gravity wave sources that exist in nature. References 15: 12 Russian, 3 Western.
[6900/163]

UDC 621.396.967

SIMULATION OF SIGNAL PROCESSING IN SYNTHETIC-APERTURE RADAR

Kiev IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOELEKTRONIKA in Russian Vol 28, No 11, Nov 85 (manuscript received 13 Mar 85 after revision) pp 19-24

N. A. Goryachev

[Abstract] Convenient ways are devised for creating models that reflect the influence of the structure of a synthetic-aperture radar, as well as the required resolution and parameters of target movement. Range resolution is enhanced by employing linear frequency modulation of the carrier frequency of the pulses and then compressing the received signals. An auxiliary function is introduced that interprets the signal prior to azimuth compression, as well as a function that interprets the signal following configuration by the range channels. Figures 2; references 3: 2 Russian, 1 Western.
[6900/157]

UDC 621.396.962

PIECEWISE-LINEAR APPROXIMATION OF PHASE DEPENDENCE OF SIGNAL IN SYNTHETIC-APERTURE RADAR

Kiev IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOELEKTRONIKA in Russian Vol 28, No 11, Nov 85 (manuscript received 1 Aug 84) pp 71-74

V. N. Glazov and G. G. Dzhavadov

[Abstract] Piecewise-linear approximation of the trajectory signal in a synthetic-aperture radar is investigated. The cross-correlation function of the trajectory signal and its approximation is found in order to assess the quality of the approximation. The absolute value of that function describes the envelope of the response of a quasi-matched filter or correlator to the input signal received from a point target, and characterizes the space resolution of the synthetic-aperture radar. The proposed approximation can also be used for matched processing of a trajectory signal produced as a result of movement of the radar along an arbitrary determinate trajectory. Figures 1; references: 2 Russian.
[6900/157]

UDC 621.391.81

SPACE-TIME FLUCTUATIONS OF RADIATION PATTERN OF ANTENNAS DURING DIFFRACTION UHF PROPAGATION

Gorkiy IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOFIZIKA in Russian Vol 28, No 10, Oct 85 (manuscript received 22 Nov 84) pp 1218-1226

P. N. Dagurov, A. S. Zayakhanov, A. Ye. Tsybikov and N. B. Chimitdorzhiev, Institute of Natural Sciences, Buryat Branch, Siberian Department, USSR Academy of Sciences

[Abstract] Fluctuations of antenna radiation patterns under diffraction multipath conditions were investigated. Measurements were made in the 10-cm band over two paths, one with a single obstacle in the form of conical hills, and another with an obstacle with an uneven crest stretched across the line of the path. Measurements of the antenna patterns in the shadow of the obstacles revealed a complex relationship between the shape of the pattern and the transverse profile of the obstacle and the location of the antenna. Diffraction multipath propagation was found to be the main cause of pattern distortions. Significant space-time fluctuations of the angles of arrival are observed for multipath propagation caused by scattering on uneven obstacles; these manifested themselves as a deviation of the main maximum of the pattern from the direction toward the source. A method is described for reducing the error in fixing the position of the radiation source on paths over rough terrain. Figures 6; references 12: 10 Russian, 2 Western.
[6900/151]

UDC 537.87

INFLUENCE OF REFRACTION ON WAVE BEAM PROPAGATION IN TURBULENT MEDIUM (ATMOSPHERE)

Gorkiy IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOFIZIKA in Russian Vol 28, No 10, Oct 85 (manuscript received 15 Nov 84 after revision) pp 1227-1235

V. V. Vinogradov, A. G. Kosterin, A. S. Medovikov and A. I. Saichev, Gorkiy State University

[Abstract] The influence of regular refraction on wave beam propagation in a turbulent medium is investigated by using linear approximation of the averaged altitude profile of the permittivity. The results are employed to interpret the experimentally discovered fact that the ratio of the angles of refraction measured at the radiation and reception points remains constant over time. It is concluded on the basis of this that the altitude gradient of the average permittivity, and consequently of the temperature, changes over time in exactly the same way at any point along the path. Figures 3; references: 14 Russian.
[6900/151]

UDC 538.566

INFLUENCE OF LOCAL IONOSPHERIC INHOMOGENEITY ON FIELD OF VERTICAL ELECTRICAL DIPOLE

Gorkiy IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOFIZIKA in Russian Vol 28, No 10, Oct 85 (manuscript received 24 May 84) pp 1236-1245

O. V. Solovev, Leningrad State University

[Abstract] The influence of local ionospheric inhomogeneities on electromagnetic wave propagation in a low-altitude waveguide is investigated. Inhomogeneity of the surface above which the propagation occurs is taken into account by introducing an irregular impedance that can change both along and across the propagation path. A two-dimensional integral equation is derived that is solved by the sequential approximation method, employing the solution of the problem for a regular impedance waveguide as the initial approximation. The influence of a spot-type inhomogeneity created by artificial microwave heating of the ionosphere is estimated as an example. The investigations indicate that the influence of local inhomogeneity on the field in the waveguide depends upon the dimensions, as well as the frequency and power of the signal used to irradiate the ionosphere. Figures 2; references 14: 7 Russian, 7 Western.
[6900/151]

UDC 621.371:551

FLUCTUATION OF MILLIMETER WAVE BEAM IN HYDROMETEORS OVER LONG LOW-ALTITUDE PATH

Gorkiy IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOFIZIKA in Russian Vol 28, No 10, Oct 85 (manuscript received 20 Nov 84) pp 1341-1343

G. A. Andreyev, A. S. Zakharov and V. A. Timofeyev, Yaroslavl State University

[Abstract] The propagation of a millimeter-wave beam in hydrometeors on a low-altitude path with reverse reflection is investigated experimentally. An experimental setup incorporating an MRL-1 weather radar and a corner reflector with effective scattering area of 3700 m^2 is described. Most of the measurements were made during steady rain. When transmitting and receiving antennas with narrow patterns are employed, the signal variations that occur during the propagation of millimeter waves in fog, snow, weak and moderate rain are insignificant, and their spectral composition is identical to that of "fast" fluctuations observed in a turbulent transparent atmosphere. However, significantly increased fluctuations were observed during hydrometeors when the electrical axis of the transceiving antenna deviates from the direction to the reflector. Significant variations in the propagation direction and angle of arrival of millimeter waves can thus occur in rain, which increases the amplitude fluctuations of the received signal. Figures 3; references 6: 3 Russian, 3 Western.
[6900/151]

DEVELOP RURAL TELEVISION

Moscow VESTNIK SVYAZI in Russian No 10, Oct 85 pp 2-3

V.P. Popovich, chief engineer, Main Administration for Space and Radio Communications, USSR Ministry of Communications

[Abstract] By 1990, television broadcasting is to extend almost throughout the USSR. Communications satellites will make it possible to receive the first All-Union television program anywhere in the nation. The number of TV rebroadcasting stations must be significantly increased during the 12th Five-Year Plan to make this possibility a practical reality. The reliability of older rebroadcast equipment must also be improved. Bulgarian television relay systems will be imported beginning in 1987 to improve reliability and to expand service. A diagram shows that low power TV relay stations will continue to grow more rapidly in number than high powered broadcast stations. Figures 1.
[96-6508]

ASSEMBLIES OF MODERN SHORTWAVE TRANSCEIVER: VFO AND VARIABLE DIVIDER

Moscow RADIO in Russian No 11, Nov 85 pp 17-21

V. Drozdov

[Abstract] This article is the second in a series by the author describing a home-built shortwave transceiver. The variable-frequency oscillator and variable divider sections are described. Schematic diagrams are presented and explained. Complete construction diagrams are given for the variable frequency oscillator and vernier. Tables 1; figures 5; references: 2 Russian.
[6900/147]

CURRENT STATUS OF CONSUMER RADIO EQUIPMENT: TUNERS, RECEIVERS, RADIO-PHONOGRAPHS

Moscow RADIO in Russian No 11, Nov 85 pp 26-29

G. Pakharkov and V. Prokofev

[Abstract] This article outlines improvements to consumer radio equipment achieved during the 11th Five-Year Plan. The review includes a comprehensive table that presents the basic parameters of tuners, tuner/amplifiers, portable radios, automobile radios, portable tape recorders, automobile recorders, radio-phonographs, "music centers" and radio complexes. Consumer radio products are being marked increasingly by improved performance and miniaturization through the use of integrated design. Tables 1.
[6900/147]

SHAFT SPEED-TO-VOLTAGE CONVERTER

Moscow RADIO in Russian No 11, Nov 85 pp 32-33

B. Piontak and Ye. Sklyar

[Abstract] A photon-coupled pair shaft-speed converter that converts frequency to dc voltage electronically is described. A disk with uniformly spaced rectangular openings is secured to the shaft of the mechanism; the light from an LED shines through the openings and strikes a photodiode as the disk turns. The frequency of the alternating current flowing through the photodiode is proportional to the shaft speed. The alternating output signal is converted to a sequence of square pulses with fixed amplitude and duration. The repetition period is the same as the period of the alternating signal. The constant component of the pulse signal is proportional to the shaft speed. The basic technical data and schematic diagram of the device are presented and explained, and the alignment procedure is outlined. Tables 1; Figures 1.
[6900/147]

NORMALIZING AMPLIFIER

Moscow RADIO in Russian No 11, Nov 85 p 37

V. Orlov

[Abstract] An audio amplifier is described that satisfies the requirements for normalizing amplifiers employed in modern sound playback systems. The schematic diagram of the transistorized circuit, which provides highly linear operation, is presented and explained. Tables 1; figures 2.
[6900/147]

SIGNAL GENERATOR

Moscow RADIO in Russian No 11, Nov 85 pp 38-40

S. Titov

[Abstract] A signal generator for producing color TV alignment signals is described. A device can be used for static and dynamic main convergence, for setting the static and dynamic light and color balance, and for checking the amplitude distortions and gain of the video circuit in ULPTsT(I)-59/61-II television receivers. The schematic diagram, PC board layouts, and voltage waveforms of the device are presented. Instructions for the use of the generator are provided. Figures 3.
[6900/147]

ANOTHER SIGNAL COMPRESSION METHOD

Moscow RADIO in Russian No 11, Nov 85 pp 40-41

V. German and G. Perestoronin

[Abstract] An analog signal subtraction device is described that is intended to replace the automatic gain control for logarithmic compressors employed to reduce the dynamic range of the input music signal for color organs. The device works as an ordinary inverting amplifier with a linear relationship between the input and output voltage if the amplitude of the input voltage does not exceed the stabilization voltage. When the input amplitude exceeds that voltage, negative voltage appears at the non-inverting input of the operational amplifier. In contrast to an AGC circuit, the zero-bias level at the output is changed as a function of the input signal amplitude, rather than the gain of the circuit. This approach also differs from compressors that employ another element in the amplifier feedback circuit. The schematic diagram of the device is presented. Figures 5; references: 2 Russian.
[6900/147]

INSTRUMENTATION PROBE FOR FIRST POWER STAGE IN ZONA-1 TELEVISION TRANSMITTER

Moscow VESTNIK SVYAZI in Russian No 11, Nov 85 p 29

V. T. Vagin, engineer, Mintenance Station 3, Starobelsk

[Abstract] This article describes the installation of a capacitive probe for taking the measurement signal directly from the output of the modulated stage in the first power stage of the ZONA-1 television transmitter. The modification consists of drilling a hole in the doors of the multiplier cabinet and installing a coaxial connector. The step-by-step alignment procedure is described. Figures 4.
[6900/146]

ALIGNMENT CHARACTERISTICS OF VIDEO CIRCUIT OF ATRS-5/1 TV TRANSMITTING STATION

Moscow VESTNIK SVYAZI in Russian No 11, Nov 85 pp 32-34

E.M. Fridman, V. V. Orlov and A. B. Zhdanov

[Abstract] A method for adjusting the video circuit of the ATRS-5/1 television transmitting station is described. The method incorporates procedures for preventing severe deformation of the amplitude-frequency characteristic in the up-converter and in the stages of the LTU-20 transistor amplifier. Methods are described for preventing distortions in the 3-4 MHz band due to parasitic capacitance of the coaxial cables leading to the test connectors. The alignment procedure is described step-by-step. Figures 10.
[6900/146]

UDC 621.382.001.1

PRINCIPLES OF MORPHOLOGICAL OPTIMIZATION OF MODELS OF BEHAVIOR OF COMBINATION CIRCUITS OF STATIONARY RECOVERABLE DIGITAL DEVICES

Kiev ELEKTRONNOYE MODELIROVANIYE in Russian No 6, Nov-Dec 85 (manuscript received 18 Sep 84 after revision) pp 31-35

A. L. Ivanov and Ye. P. Ugryumov

[Abstract] The principles of morphological optimization of behavioral models of combination circuits are formulated. Simple bracketed Boolean expressions are employed as the base structure of the behavioral model of a regular combination circuit. The models of behavior of combination circuits can be optimized morphologically by means of isolating factoring methods, in which case the competing parameters are the dimensionality of the factors of the subformulas and the number of types of morphologically uniform subformulas in the bracketed Boolean expression formula. The models of behavior of combination circuits can be optimized morphologically in any functionally complete basis. The use of the methods derived in designing digital display devices for automated air traffic control systems made it possible to reduce the number of types of modules in digital equipment by factors ranging from 2 to 5, and to shorten the design time by factors of 2-3. Figures 3; references: 5 Russian.
[6900/160]

UDC 621.371.344.001.24

A GENERALIZED STABILITY FUNCTION FOR MULTIPATH RADIO LINKS

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 30, No 10, Oct 85
(manuscript received 19 Jan 84) pp 1890-1894

O. P. Frolov and V. G. Yampolskiy

[Abstract] A new type of generalized stability function for radio links is proposed that is suitable for practically any multipath radio link and that has a simple analytical representation suitable for further mathematical transformation to assist radio link performance. The behavior of the proposed stability function is investigated for these characteristic values of the distribution parameter ν. Signal stability on line-of-sight radio links is investigated. The effectiveness of paired reception is assessed as an example. The stability functions also make it comparatively easy to obtain other estimates of link performance, such as the nonlinear noise level due to reception by the antennas of the valid signal in conjunction with parasitic interference from adjacent radios. Figures 2; references 11: 5 Russian, 6 Western.
[6900/136]

UDC 621.396.96:621.391.26.001.24

STATISTICAL CHARACTERISTICS OF SEQUENTIAL SIGNAL DETECTION UNDER CORRELATED INTERFERENCE CONDITIONS

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 30, No 10, Oct 85
(manuscript received 22 Feb 84 after revision) pp 1936-1940

V. A. Averochkin and P. Ye. Baranov

[Abstract] This study investigates the problem of finding the exact duration distributions of a sequential detection procedure for determinate and Gaussian correlated signals against the background of Gaussian correlated interference. The duration distribution is determined by finding the joint distribution densities of the successive likelihood ratios, or the monotonic functions of those ratios, followed by appropriate multiple integrations. The

joint distribution densities are determined for the decision statistics for the signal and interference models employed. The influence of correlation, and of the signal/interference ratio, on the duration distribution and the effectiveness of sequential detection is established. Figures 3; references: 9 Russian.
[6900/136]

UDC 621.391.83.088

FEATURE OBSERVATION METHOD FOR DISCRETE REALIZATION OF SIGNAL

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 30, No 10, Oct 85 (manuscript received 23 May 83) pp 1941-1948

V. V. Ivanov

[Abstract] An improvement is proposed for a signal interpretation method developed previously by the author in which the zeros of the Fourier transform of the signal in the frequency plane are interpreted. In the revised method, the features of the path and the features of the source are interpreted, making it unnecessary to deal with the Fourier plane. In the proposed version of the feature method, the procedure by which the signal is recovered from the features consists of estimating the coefficients of a polynominal by its zeros, since the coefficients of the polynominal are proportional to the successive values of the recovered function at equidistantly separated points. An example of the use of the proposed procedure for recovering the path and signal is presented. The correspondence between the feature method in the Fourier plane and the proposed feature method in the z plane is analyzed. Figures 4; references 8: 6 Russian, 2 Western.
[6900/136]

UDC 621.391.825

PHASE LOCKING OF STOCHASTIC SELF-SUSTAINED OSCILLATIONS BY PERIODIC EXTERNAL SIGNAL

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 30, No 10, Oct 85 (manuscript received 25 Jun 84) pp 1970-1974

A. S. Pikovskiy

[Abstract] The influence of an external periodic signal on stochastic self-sustained oscillations is investigated theoretically and experimentally. Phase locking of stochastic self-sustained oscillations, i.e., partial suppression of the phase diffusion, is examined. The phase locking effect is investigated experimentally using a simple feedback noise generator consisting of an oscillating tuned circuit closed through a positive feedback

amplifier that incorporates a tunnel diode. The experimental findings confirm the theoretical conclusions completely. Figures 5; references 8: 7 Russian, 1 Western.
[6900/136]

UDC 537.871.6.001.24

SOLUTION OF PROBLEM OF OBTAINING STABLE PHASE DIFFERENCE

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 30, No 10, Oct 85 (manuscript received 6 Oct 83) pp 2054-2055

F. K. Povolotskiy

[Abstract] This study investigates the problem of determining the optimal ratio of path links for which the time elapsed between the moments of arrival of signals over those paths is stable with respect to change in a common parameter upon which the signals depend differently. Optimal conditions are derived that can be extended to systems consisting of n paths carrying n signals. The findings can be used for obtaining a stable phase offset between signals propagating in media with different refraction coefficients. References: 1 Russian.
[6900/136]

BROADLY SUPPORT THE INITIATIVE OF AVTO VAZ ASSOCIATION

Moscow VESTNIK SVYAZI in Russian No 10, Oct 85 p 4

Unsigned

[Abstract] Avto VAZ Association has accepted the obligation of achieving good results in terms of accelerating scientific and technical progress, increasing production and its effectiveness in comparison with the norms established for the 12th Five-Year Plan. Based on broad introduction of the achievements of scientific and technical progress, workers at Moscow's Territorial Center for Administration of Long Distance and International Communications and the Order of Lenin Central Telegraph unit of the USSR Communications Ministry have decided to achieve higher tariff income, increase the volume of production, achieve increases in productivity of labor and decreases in cost of products, consumption of materials and fuel, and to achieve all increases in volume of production by increasing productivity of labor. In 1986, output is to be 100,000 rubles above the plan, productivity of labor higher by 4%. The Central Telegraph System plans to work for 15 days using resources saved during the rest of the year. The USSR Ministry of Communications and the Presidium of the Central Committee of the Communications Workers Union have approved the initiative here described and recommended that it be adopted throughout the land.
[96-6508]

DEVELOPMENT OF METHODS OF SATELLITE COMMUNICATIONS

Moscow VESTNIK SVYAZI in Russian No 10, Oct 85 pp 25-26

S.A. Varbanskiy, senior engineer, Scientific Research Institute of Radio

[Abstract] Satellite relay links have the advantage over land links in that only one intermediate relay point (the satellite) is required. A number of stations can use a satellite simultaneously, with interference prevented by frequency separation of channels or time separation of signals. The Gruppa system used for satellite communications within the Soviet Union divides a trunk into 24 bands (groups) with separation between carriers in each group 1.35 megahertz. Frequency modulation can carry a standard 12-channel group on each carrier with frequency separation of telephone channels in the 12-60 kilohertz band or by phase modulation of a digital pulse stream at 5.12 kbps carrying 8 telephone channels. Up to 24 ground stations can operate with the Gruppa apparatus in one trunk at once, creating 12 duplex links of 12 or 8 telephone channels each. The Gradient-N equipment utilizes the one carrier per channel method for communications in the InterSputnik international organization, allowing creating of 100 duplex telephone channels. Separation between telephone channel carriers is 160 kHz, between two channels forming a duplex link-17.6 MHz. Figures 2.
[96-6508]

MINICOMPUTER-CONTROLLED AUTOMATIC CROSSBAR EXCHANGE

Moscow VESTNIK SVYAZI in Russian No 11, Nov 85 pp 16-19

Ye. L. Grossul, senior engineer, Petrograd Telephone Center, Leningrad Municipal Telephone System, S. Ya. Zaychikova, senior engineer, and G. E. Zelyakh, engineer, Leningrad Department Scientific Research Institute of Communications

[Abstract] This article describes the computer analysis of coded messages representing test and diagnostic data from automatic monitoring devices serving automatic crossbar exchanges. The coded messages contain information on each connection denied due to malfunction of a control device (marker or register) in each call-handling stage, and the number of that controller. The signals from the automatic monitoring device are entered via a teletype on punch tape, which is then processed by computer. The software for processing this information that runs on the SM-1 minicomputer is described. The use of computerized processing of data from automatic monitoring devices was found to double the efficiency of use of those devices at exchange ATSK-252 in Leningrad; even where utilization efficiency is not improved, computer processing reduces the amount of labor required to process coded malfunction messages. Figures 4.
[6900/146]

REMOTE LINE CIRCUIT MONITORING OF IKM-12M RURAL TRANSMISSION SYSTEMS

Moscow VESTNIK SVYAZI in Russian No 11, Nov 85 pp 25-26

D. A. Podberezin, section chief, Central Scientific Research Institute of Communications, T. B. Sirkis and O. O. Levushkina, engineers

[Abstract] This article describes modification of the line circuit monitoring equipment employed with the IKM-15 digital transmission system to allow it to be used for remote monitoring of IKM-12M line circuits. The primary modification consists of reworking the BTK (remote monitoring unit) and connecting it to the PS (intermediate station) circuit. The use of this remote circuit monitoring system with IKM-12M equipment reduces the amount of labor required in tracing faults. The devices can be modified easily and inexpensively, and require no additional adjustment. Figures 3.
[6900/146]

ENHANCEMENT OF OPERATING RELIABILITY OF TsKS-T MESSAGE SWITCHING CENTER

Moscow VESTNIK SVYAZI in Russian No 11, Nov 85 pp 30-32

V.I. Goryunov, deputy chief, Leningrad Telegraph Message Switching Center, and V. I. Lukyanovich, chief, Computer Services

[Abstract] This article outlines operating experience gained with the message switching center installed at the Leningrad telegraph office in 1983, including the computer complex and other computer facilities. The personnel organization for equipment operation and maintenance is described. The maintenance and repair procedures employed are outlined. The analysis of statistical malfunction data is discussed. Support facilities, including fail-safe power supply and air conditioning, are described. Figures 3.
[6900/146]

ANALYSIS OF STATISTICAL DATA ON PERFORMANCE OF AUTOMATIC LONG DISTANCE TELEPHONE EXCHANGES AND TRUNK CONNECTIONS

Moscow VESTNIK SVYAZI in Russian No 11, Nov 85 pp 34-36

A. A. Silkin

[Abstract] Statistical data on the operation of AMTS-1M exchange equipment gathered over several years of automatic monitoring by a M-6000 computer are analyzed in order to identify the most informative set of parameters of automatic long distance exchanges. The basic exchange equipment was monitored: individual long distance connectors, group devices, and translators. Data acquisition was performed twice daily, during the morning and afternoon peak hours. The operation of the AMTS-1M equipment was evaluated in terms of 19

different indicators. The most informative parameters were found to be the number of lost calls at the exchange (disregarding those due to lack of available channels or improper dialing by the subscriber), and the number of RSLA-MIR (automatic line and outgoing long distance register connector) seizures per conversation. Decision rules are constructed that employ linear discriminate functions in order to select the optimal set of parameters. The method has been used in a number of cities, where it has made it possible to monitor equipment operation in a more timely fashion and to reduce the fault tracing time by a factor of 1.2.
[6900/146]

UDC 621.395:621.315.212.654.01

CCITT RECOMMENDATIONS ON GENERAL TECHNICAL MAINTENANCE PRINCIPLES

Moscow ELEKTROSVYAZ in Russian No 11, Nov 85 pp 62-64

A. A. Rokhdestvenskiy

[Abstract] This article presents and analyzes three new CCITT recommendations prepared during 1981-84: Recommendation M.20, "Philosophy of Technical Maintenance of Analog, Digital, and Mixed Networks", Recommendation M.22, "Principles of Utilization of Emergency Signalling For Technical Maintenance of International Transmission Systems and Equipment", and M.24, "Principles of Utilization of Technical Maintenance Information For Observing Parameters of International Transmission Systems and Equipment". These recommendations provide a common approach and instructions for technical maintenance that are useful for the development of an automated line maintenance system, as well as maintenance instructions and rules. Many of the principles put forth in these recommendations are widely used in the telecommunications network, and are part of the technical documentation, such as the technical maintenance rules.
References 3: 1 Russian, 2 Western.
[6900/155]

UDC 621.395.347

IMPLEMENTATION OF COMMON-CHANNEL SIGNALLING SYSTEM IN RURAL TELEPHONE NETWORKS

Moscow ELEKTROSVYAZ in Russian No 11, Nov 85 (manuscript received 1 Mar 84) pp 14-17

N.A. Sokolov and P.A. Yunakov

[Abstract] The basic problems involved in implementing common-channel signalling in rural telephone systems are analyzed, and strategies are developed for introducing stored-program automatic exchanges. It is found that switching equipment of the same type should be introduced in concentrated

fashion in order to simplify interaction and make operations easier; electronic exchanges should be introduced by the "superimposed" network method. Different versions of common-channel signalling systems are presented, and interaction among signalling systems is described. It is recommended that stored-program exchanges be introduced starting at the central exchange level; there should be no more than one transition from a common-channel signalling system to a decentralized signalling system within the same rural telephone network. Because of the high throughput capacity of common-channel signalling systems and the small groups of trunks in rural networks, low data rates can be used for the signalling information, making it possible to use less expensive signal and transmission devices or voice grade channels or physical circuits. Figures 1; tables 2; references 6: 5 Russian, 1 Western. [6900/155]

UDC 621.395.743

COMPUTER-AIDED CONTROL OF RURAL TELEPHONE NETWORK EXPANSION

Moscow ELEKTROSVYAZ in Russian No 11, Nov 85 (manuscript received 6 Jan 84) pp 17-20

A.A. Kayatskas and V. Yu. Pachesa

[Abstract] A computerized subsystem for controlling rural telephone network expansion consisting of interconnected individual subsystems is described. The individual subsystems, whose purpose is to compile long-range development plans for rural telephone networks, include the following: Network status, predicted status, and analysis of reserves. The source data includes the arbitrary telephone exchange number, the installed and activated capacity of the exchange, the number of trunks, the number of residents within the zone of a given exchange, the number of overhead lines, the number of multiplexed overhead lines, the number of channels carried on overhead lines, the number of cable lines, the total and utilized number of channels and cable lines, the number of subscribers by types, and the distance of a given exchange from the Rayon center or from the center at which a channel group is formed. Using this information, the subsystems produce data for calculating the amount and composition of equipment needed, the amount of work required to expand and build automatic exchanges and trunks, and the estimated cost of equipment, materials, and labor. Tables 3; figures 1; references: 3 Russian. [6900/155]

UDC 621.315:621.395

STATUS AND PROSPECTS FOR DEVELOPMENT OF RURAL COMMUNICATIONS CABLES

Moscow ELEKTROSVYAZ in Russian No 11, Nov 85 (manuscript received 2 Oct 84) pp 20-23

N. A. Avdalyan, M. A. Voss and Yu. A. Parfenov

[Abstract] This article provides an overall characterization of the telecommunications cables employed for rural communications, and of cables that exist or are under development for future use. The electrical characteristics of KSPP and KSPZP cables now in use are presented in table form. Single-quad KSPP and KSPZP cables are employed mainly for interexchange routes. Subscriber networks employ mainly type TPP and PRPP cable. The varieties of high-reliability and stable type TPP and TG cables are compared in a table. Tables 2; references: 3 Russian.
[6900/155]

UDC 621.396.56

ZONA-15 EQUIPMENT COMPLEX FOR RURAL PRIMARY NETWORKS

Moscow ELEKTROSVYAZ in Russian No 11, Nov 85 (manuscript received 25 Apr 84) pp 24-29

A.P. Bayev and V.M. Perlin

[Abstract] This article describes the ZONA-15 equipment complex, which supports flexible and economical construction and development of primary rural networks employing KSPP single-quad cables. The complex supports 15- and 30-channel groups of voice grade channels, channels for transmitting control and supervision signals, channels for transmitting class-II audio broadcasting, 8 kbps digital transmission channels, 64 kbps primary digital channels, channels for transmitting digital information at up to 100 bps or 200 bps, as well as the extraction and redistribution of these channels in baseband circuits at rural network nodes. The complex is made up of network node and exchange equipment, digital cable line circuit equipment, equipment for interfacing with secondary networks, special-purpose instrumentation, and spare parts and accessories. The construction of a primary rural network employing the ZONA-15 complex is described, and the procedures for configuring, building, and operating the complex are explained. Figures 6; tables 4; references: 6 Russian.
[6900/155]

UDC 621.395.44:621.376.56

RING STRUCTURES IN RURAL DIGITAL DISTRIBUTION TRANSMISSION SYSTEMS

Moscow ELEKTROSVYAZ in Russian No 11, Nov 85 (manuscript received 19 Oct 84) pp 29-33

L.A. Chernyshev and V.M. Shteyn

[Abstract] The use of ring structures for the line circuit serving distribution transmission systems is described. The concept of ring structure is defined, and the reliability of ring distribution systems is analyzed. Ring structure is found to be more suitable for large-scale production, and to provide low initial operating costs, good reliability, and network design flexibility. Ring systems can also be used in other branches of communications, such as private-branch communications between facilities located in a given area. Figures 6; references: 7 Russian.
[6900/155]

UDC 621.394.62(088.8)

PROSPECTS FOR DEVELOPMENT OF DIGITAL TRANSMISSION SYSTEMS FOR OVERHEAD SUBSCRIBER COMMUNICATIONS LINES

Moscow ELEKTROSVYAZ in Russian No 11, Nov 85 (manuscript received 25 Apr 84) pp 33-38

B.N. Maglitskiy, O.N. Porokhov and I.V. Sitnyakovskiy

[Abstract] This study discusses the possibility of developing digital transmission systems to operate on overhead subscriber lines. The characteristics of overhead lines and the requirements for the signals carried are described. The basic requirements for digital transmission systems for use on such lines are discussed. The use of 3V2T code and three-level relative monopulse transmission is explained. It is found that the use of digital transmission systems when switching rural networks over to cable lines makes it possible to avoid removing the overhead line structures, and to employ them for additional expansion of the network. The use of digital transmission systems on overhead trunks is promising. Figures 4; tables 4; references 14: 13 Russian, 1 Western.
[6900/155]

UDC 621.395.743

ORGANIZATION OF INCOMING COMMUNICATIONS AT RURAL TELEPHONE EXCHANGE FROM MANUAL LONG DISTANCE EXCHANGE AT RAYON CENTER

Moscow ELEKTROSVYAZ in Russian No 11, Nov 85 (manuscript received 9 Apr 84) pp 42-46

L. M. Golshteyn

[Abstract] The handling of incoming traffic at rural exchanges from manual long distance exchanges at Rayon centers is described. Because rural exchanges employ trunk groups for interexchange traffic that serve local and long distance calls alike, the trunks must satisfy requirements in terms of conversation circuit attenuation, which must not exceed 9.5 dB at 800 Hz between the subscriber's set and the long distance exchange. Because the subscriber loop attenuation is 4.5 dB, and that of the exchange devices is 0 or 1 dB, depending upon the type of tandem setup, the combined attenuation of the trunk must not exceed 2-4 dB. It is found that the attenuation norms can be satisfied when crossbar and quasielectronic equipment is used by retaining four-wire tandeming of long distance and local connections at central and node exchanges, and using channels with attenuation of 7 dB for all types of connections at central exchanges. Figures 7; references: 3 Russian. [6900/155]

UDC 621.396.43

ASSESSMENT OF OPERATING STABILITY OF DIGITAL RADIO RELAY LINKS WITH FREQUENCY-SELECTIVE FADING

Moscow ELEKTROSVYAZ in Russian No 11, Nov 85 (manuscript received 16 May 85) pp 47-50

N.I. Kalashnikov and P. G. Kaplunov

[Abstract] A general method is derived for assessing the operating stability of digital radio relay links subject to selective fading due to reflections from tropospheric irregularities. The case in which two waves are received - the direct wave and that reflected from trophospheric irregularities - is simulated. The analytical findings agree well with the experimental data, indicating that the model and assumptions are correct. The stability of a link employing 16-level quadrature amplitude-phase modulation is analyzed as an example. The results indicate that selective fading due to reflection from stratified tropospheric irregularities can be disregarded for data rates slower than 8.448 Mbps. The stability is not as good on paths near water as over dry land, due to the selectivity of the fading. Stability is improved at data rates slower than 34.338 Mbps by increasing the energy potential of the equipment; however, this also increases the sensitivity to selective fading. The proposed approach can also be used for fading caused by reflection from the ground. Tables 2; figures 1; references 10: 5 Russian, 5 Western. [6900/155]

UDC 621.396.677.32/41

EXPERIMENTAL INVESTIGATION OF TRAVELLING-WAVE ANTENNA VERSION

Moscow ELEKTROSVYAZ in Russian No 11, Nov 85 (manuscript received 28 Jan 85 after revision) pp 51-53

K. P. Kharchenko, V. P. Demidov and V. M. Timofeyev

[Abstract] A new version of the type OB Beverage travelling-wave antenna - the OB-E - is described. The antenna studied is a phased lateral array consisting of two identical OB-E 300/3 antennas. Each element of the antenna is made of four conductors connected in parallel and separated in space by 0.2 m vertically and 6 m horizontally. The radiation patterns of the antenna were measured in the azimuthal plane by means of fly-bys intersecting the main lobes along the line of maximum radiation. The OB-E antenna is found to be highly suitable, in terms of design, electrical, economic, and operating parameters, for forming the optimal radiation pattern to enhance communications reliability. Figures 8; references 4: 3 Russian, 1 Western. [6900/155]

UDC 621.11.6

POWER SUPPLY BASED ON SINGLE-STAGE VOLTAGE CONVERTER

Moscow ELEKTROSVYAZ in Russian No 11, Nov 85 (manuscript received 3 Dec 84) pp 57-61

S. G. Buzykin, A. G. Polikarpov and Ye. F. Sergienko

[Abstract] A secondary power supply for digital data systems based on a single-stage voltage regulator is described. A method is proposed for increasing the maximum acceptable voltage of the power transistor. Design approaches are described that ensure strong magnetic coupling between the primary and secondary windings of the power transformer. The use of a converter with partial modulation of the voltage at the filter input makes it possible to obtain good size and weight indicators and stability. The use of emitter-controlled switches ensures small switching losses even when inertial high voltage transistors are used. Figures 6; references: 4 Russian, 1 Western. [6900/155]

UDC 656.25:621.391.8

EFFECT OF AUTOMATIC EQUIPMENT CIRCUITS ON MAGNITUDE OF NOISE IN COMMUNICATIONS CHANNELS

Moscow AVTOMATIKA, TELEMEKHANIKA I SVYAZ in Russian No 11, 1985 pp 12-13

G. L. Slesarenko, chief specialist Irkutskgiprotrans Institute, and A.P. Koshelev, junior research worker, Leningrad Institute of Railroad Transportation Engineers imeni Academician V.N. Obraztsiv

[Abstract] Based on the experience of East-Siberian Railroad communication personnel over a number of years with respect to the appearance of concrete cases and sources of an increase of the noise level in railroad communications channels, the most typical causes of the electromagnetic effect of exterior sources are described. These cases show the necessity for development and introduction of a complex of measures with respect to a decrease of the effect of exterior devices on all communication lines. A list of such measures is presented.
[140-6415]

UDC 656.254.16:621.396.7

TUNING AND ADJUSTMENT OF UFT721 RADIO STATION

Moscow AVTOMATIKA, TELEMEKHANIKA I SVYAZ in Russian No 11, 1985 pp 22-24

B.M. Lapshin and V.T. Brezgunov, senior engineers, Central Communications Service, Ministry of Railroads

[Abstract] This detailed procedure for tuning and adjustment of the UFT721 (Latin alphabet) radio station is proposed as a supplement to the set of service documentation delivered with the radio station by the manufacturer. The procedure described specifically mentions the transmitter and the UBT70 (Latin alphabet) control block. The measuring instruments required for tuning the radio station are listed. Tables: 6.

UDC 658.011.54/56:621.317

MEASUREMENTS AUTOMATION BASED ON MICROPROCESSOR DEVICES AND MICRO-ELECTRONIC COMPUTER

Moscow AVTOMATIKA, TELEMEKHANIKA I SVYAZ in Russian No 11, 1985 pp 27-29

G.P. Malay, head of department of Khabarovsk Institute of Railroad Transport Engineers, A.I. Batkin, junior research worker, and V.I. Borchenko, senior research worker

[Abstract] The paper describes two systems of automated measurements (SAM), developed at the Department of Automatics and Telemechanics of the Khabarovsk Institute of Railroad Transport Engineers in collaboration with workers of the Far-Eastern road. One of the systems, constructed on the base of an SM-1800 micro-electronic computer, is intended for stationary conditions and makes it possible to measure and monitor up to 600 signals in a cylical or selective regime. The system developed is chiefly intended for automated measurement in track circuits on storage battery and supply feeders. Operation of the system in three basic regimes is envisaged. The second SAM, constructed on the base of an Elektronika-60 micro-electronic computer, is intended for both stationary and nonstationary conditions and makes it possible to fulfill measurements of 16 signals. Experimental tests of the two SAM developed displayed their high efficiency in stationary conditions and in the conditions of electrified sectors. Figures 3.

UDC 656.25.071.84

EXPERIENCE IN INSTALLATION AND MAINTENANCE OF CABLE TRUNK

Moscow AVTOMATIKA, TELEMEKHANIKA I SVYAZ in Russian No 11, 1985 pp 29-30

A.I. Napalkov, deputy chief of Prokhladnensk Division of the North-Caucasian Road

[Abstract] In recent years, in connection with electrification of part of the railroad in the division, trunk cable runs were installed instead of overhead communication lines, which makes it possible to increase the number of communication channels, to reduce the number of line faults, to improve communication quality, and to decrease maintenance expenditures. The paper discusses the quality of execution of building and installation work during laying of the trunk. Regular practical study by personnel is conducted with respect to development of skills concerned with cable splicing, transfer to a one-cable system of the K-60P apparatus (illustrated) of one of the amplifying sections, switching over to the reserve track, and other items. These studies contribute to ensuring clear-cut labor of the communication personnel in case of damage and its elimination with a minimum interruption of communication. Figures 2.

SERVICE OF F1100 ELECTRONIC TELEPRINTERS

Moscow AVTOMATIKA, TELEMEKHANIKA I SVYAZ in Russian No 11, 1985 pp 30-31

N.I. Belopolsky, senior electromechanic, Vinnitsk Division of South-West Road; V.I. Grebebyuk, electromechanic

[Abstract] In the Vinnitsk Division of the South-West road, type F1100 (Latin alphabet) electronic teleprinters work on telegraphic communication in three regimes: transmission, reception, and conference connection. All of the teleprinters are included in voice-frequency carrier telegraphy channels in a two-band regime by means of type DU1001 (Latin alphabet) converters. Prior to introduction of the F1000, the channels of the voice-frequency carrier telegraphy were already prepared for operation with electronic equipment because the UVP-2 (Cyrillic alphabet) adapters, included earlier in these channels, were equipped with an electronic relay instead of the RP-4 (Cyrillic alphabet) relay. The paper discusses the results of operational experience with F1100 teleprinters and DU1001 converters. An analyzer of the sequence of signs, based on the D19 (Cyrillic alphabet) microcircuit (illustrated) and used for reception of priority signals is described. Figures 1.

UDC: 621.371[1]:624.19

FREE PROPAGATION OF 150-460 MHz RADIOWAVES IN TUNNELS

Moscow AVTOMATIKA, TELEMEKHANIKA I SVYAZ in Russian No 12, Dec 85 pp 4-6

V.V. Degtyarev, graduate student, Leningrad Institute of Railroad Transport Engineering, G.A. Kuzmenko, senior scientific fellow, Omsk Institute of Transport Engineering, V.I. Nikitin, Dotsent, and V.V. Karpov, chief, Scientific Research Laboratory of Radio Communications, Omsk Institute of Transport Engineering

[Abstract] Measurements were performed at three fixed frequencies: 153, 350 and 459 MHz. The transmitting apparatus was trucked through the tunnel on rails, the receiver located near one end of the tunnel. Measurements were performed twice at each frequency, the first time with the receiver antenna inside the tunnel at 5 m height, attached to the tunnel wall with a metal bracket 20 cm long, the second time with the receiving antenna installed on a tripod outside the tunnel at a height of 5 m, 2.5 m from the center of the track. Half-wave dipole receiving antennas were used. Measurements were performed both in a single-track electric railroad tunnel and a two-track nonelectrified tunnel. The communications range for the single-track electrified tunnel at 150, 350 and 450 MHz averaged 0.3, 0.6 and 0.9 km, for the two-track nonelectrified tunnel - 0.3, 1.0 and 1.5 km. Range was greater with the antenna outside the tunnel by an average of 0.3 km. Signal attenuation is less in tunnels with cast iron tubing liners than in tunnels with reinforced concrete liners.
[162-6508]

UDC: 656.254 16:621.396.7

ADJUSTMENT AND REGULATION OF THE UFT721 RADIO SET (CONCLUSION)

Moscow AVTOMATIKA, TELEMEKHANIKA I SVYAZ in Russian No 12, Dec 85 pp 17-18

B.M. Lapshin and V.T. Brezgunov, senior engineers, Central Communications Station, Ministry of Railroad Transport

[Abstract] This article, the conclusion of a two-part series begun in the same journal, Number 11, 1985, continues a technical description of the procedure for adjustment and regulation of the UFT721 radio set. The receiver, LF amplifier, HF amplifier, mixer and economizer are covered in this part of the series.
[162-6508]

UDC: 656.25:621.317:656.254.16

RAILROAD RADIO COMMUNICATION MEASUREMENT SYSTEM WITH AUTOMATIC INFORMATION PROCESSING

Moscow AVTOMATIKA, TELEMEKHANIKA I SVYAZ in Russian No 12, Dec 85 pp 20-22

V.V. Kozeyev, chief, Traveling Laboratory, Transbaikal Railroad, and V.I. Gerasimenko, senior electrical technician, Laboratory for Automation, Telemechanics and Communications

[Abstract] An automated radio measurement system has been developed by the Transbaikal Railroad. The system is installed in a laboratory car and allows measurement and recording of: train radio communications station signal levels and noise levels at communications frequencies, deviation of transmitter frequencies, deviation of calling frequencies of 1000 and 1400 Hz, carrier frequency at 2130 KHz, coordinates of location and speed of movement of the laboratory car. The measurement process is fully automated, measurements requiring one second during receipt of the calling frequency, after which all measured parameters are automatically recorded in memory for later printout. Each parameter can also be measured manually. No adjustments or regulation are required during measurement. Operation of the system requires only input of the station code and pressing of the button, after which the ready light goes on.
[162-6508]

TEST STAND FOR TESTING RADIO STATION POWER SUPPLY UNITS

Moscow AVTOMATIKA, TELEMEKHANIKA I SVYAZ in Russian No 12, Dec 85 pp 40-41

L.P. Maslyayev, senior electrical technician, Leningrad-Baltic Section, October Railroad

[Abstract] The test stand here described is used to test the power supply units of the 43RTS-A2-ChM, 71RTS-A2-ChM and 38RTS-A2-ChM radio sets. The unit is an independent portable device which can be placed next to the power supply being tested. The power supply units are removed from the radio sets before testing. The testing unit provides all supply voltages, equivalent loads, switching circuits, input and output contacts required for testing. A schematic diagram of the test unit is presented. A list of the elements used in the unit is also provided. Safety instructions for use of the device are included.
[162-6508]

UDC 621.396.235

PARAMETER ESTIMATION IN MULTICHANNEL SIGNAL RECEPTION

Kiev IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOELEKTRONIKA in Russian Vol 28, No 11, Nov 85 (manuscript received 27 Dec 84 after revision) pp 3-6

A.P. Trifonov and Yu. S. Radchenko

[Abstract] This study examines the maximum likelihood estimate of the non-energy parameter of an RF signal sent over a number of parallel channels with slow amplitude and phase fading. Asymptotic expressions are derived for the characteristics of the estimate considering anomalous errors. The expressions derived for the characteristics of the maximum likelihood estimate are asymptotically exact as the signal/noise ratio and the reduced length of the a priori interval approach zero. The limits of applicability of the derived formulas is modeled by computer for finite signal/noise ratios and a priori interval lengths. Figures 1; references: 9 Russian.
[6900/157]

UDC 621.391.256

RECURSIVE ALGORITHM FOR SIGNAL DETECTION BY SEQUENCE ESTIMATION FOR SEMI-CONTINUOUS COMMUNICATIONS CHANNEL

Kiev IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOELEKTRONIKA in Russian Vol 28, No 11, Nov 85 (manuscript received 10 Jul 84) pp 8-14

A. I. Turkin

[Abstract] A method is examined for designing a constructive algorithm for decoding linear codes on the basis of numerical solution of continuous extremal conditional optimization problems. The transmitted message vector is estimated by solving a system of difference equations. The structural diagram of a decoder that implements those equations is presented. The degree of approximation of the iterative decoding algorithm to ideal detection by sequence estimation can be judged by estimating the average probability of erroneous decoding. Figures 2; references 9: 5 Russian, 4 Western. [6900/157]

UDC 621.396

SYNTHESIS OF OPTIMAL RECURSIVE SIGNAL PROCESSING ALGORITHMS

Kiev IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOELEKTRONIKA in Russian Vol 28, No 11, Nov 85 (manuscript received 11 Mar 85 after revision) pp 14-19

V.M. Koshevoy

[Abstract] This study examines the synthesis of recursive optimal processing algorithms assuming Toeplitz structure of the correlation matrices. These algorithms are computationally more efficient than methods based on manipulating matrices with common structure, and make it possible to set up adaptive open-type processing without the direct formation and manipulation of correlation matrices. Recursive algorithms are also presented for correlation matrix manipulations, estimation of the inverse correlation matrix, and adaptive signal processing. Figures 1; references 8: 6 Russian, 2 Western. [6900/157]

UDC 621.321.2

MEASUREMENT OF AMPLITUDE OF PERIODIC SIGNAL WITH LEVEL LOWER THAN NOISE

Kiev IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOELEKTRONIKA in Russian Vol 28, No 11, Nov 85 (manuscript received 27 Mar 85 after revision) pp 24-29

Yu. Ya. Yurov and V. N. Golovanov

[Abstract] This study examines the theory of measuring a harmonic signal that is weaker than noise by means of a simple device consisting of an amplifier-limiter and a local oscillator whose frequency is close to the signal frequency and which is controlled by a selection circuit that determines the polarity of the amplified voltage and reversible counter when the oscillator voltage crosses zero. Analytical formulas are derived for determining the measurement time as a function of the signal/noise ratio and the required measurement accuracy. The use of Chernoff's bound makes it possible to obtain the connection between the signal/noise ratio, the measurement accuracy, and the required accumulation time. The formulas derived agree entirely with experimental data. Figures 2; references 5: 2 Russian, 3 Western.
[6900/157]

UDC 621.372.5

COMPUTATION OF DISCRETE HILBERT TRANSFORM IN SPECTRAL DOMAIN OF WALSH-HADAMARD FUNCTIONS

Kiev IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOELEKTRONIKA in Russian Vol 28, No 11, Nov 85 (manuscript received 22 Jan 85 after revision) pp 45-49

V.A. Vlasenko, Ya. Ipser and D. Yeger

[Abstract] A discrete Hilbert transform algorithm in an orthogonal Walsh-Hadamard basis is derived that is computationally more efficient than the discrete Hilbert transform in a discrete exponential function basis. Algorithms in the two bases are compared by computer, indicating that the proposed Walsh-Hadamard algorithm can be used when the dimensionalities of the initial signal vectors are small and the hardware limitations on the capacity of the memory used to store the coefficients of the transformation matrix are not overly strict. Figures 3; references 12: 6 Russian, 6 Western.
[6900/157]

UDC 621.391

COMPOSITION AND DECOMPOSITION METHODS IN OPTIMIZATION OF ELECTRONIC SYSTEMS IN TERMS OF SET OF PERFORMANCE INDICATORS

Kiev IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOELEKTRONIKA in Russian Vol 28, No 11, Nov 85 (manuscript received 28 Jan 85 after revision) pp 57-62

N.S. Gubonin

[Abstract] The mathematical relationship between the result of optimizing a radio system with respect to a set of performance indicators and the unconditional preference criterion and the results of analogous optimization of its subsystems is analyzed. When optimizing a radio system as a whole, it is found unnecessary to solve the decomposition problem formally, inasmuch as the decomposition is assigned by the existing partitioning of the system into functional subsystems. The composition method presented provides computational and organizational advantages, especially when the results of optimization of the subsystems with respect to the unconditional preference criterion are known in the form of analytical solutions of the corresponding multidimensional exchange diagrams. The range of possible applications of the composition method for optimizing radio systems depends upon the extent to which the optimization of different radio devices (subsystems) in terms of the unconditional preference criterion have been worked out. Figures 1; references 11: 10 Russian, 1 Western.
[6900/157]

UDC 621.375.8

FLUCTUATION SENSITIVITY OF RECEIVER AND FORM OF OUTPUT DEVICE FREQUENCY RESPONSE

Gorkiy IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOFIZIKA in Russian Vol 28, No 10, Oct 85 (manuscript received 15 May 84) pp 1246-1249

I.I. Yeru and A.S. Peskovatskiy, Institute of Radio Physics and Electronics, Ukrainian SSR Academy of Sciences

[Abstract] An analysis is made of the influence of the form of the frequency response of the low-noise input amplifier, and the degree of mismatch between the noise temperatures and bandwidth of the amplifier and the rest of the receiver, on its fluctuation sensitivity during reception of a wideband noise signal. Analytical expressions are derived for rectangular, Gaussian, and Lorenz input amplifier frequency responses that make it possible to determine the sensitivity gain achieved by placing a low noise amplifier at the receiver input for any values of the frequency response, bandwidth, noise temperature, and power gain. The possibility of improving the sensitivity of millimeter-band receivers by placing a quantum paramagnetic amplifier at their input is analyzed as an exmaple. Figures 1; references 10: 7 Russian, 3 Western.
[6900/151]

UDC: 621.357.6:621.3.049.75:621.793

INCREASING QUALITY OF PRINTED CIRCUIT BOARD MANUFACTURE

Moscow PRIBORY I SISTEMY UPRAVLENIYA in Russian No 12, Dec 85 pp 33-34

A.P. Stepanov, engineer

[Abstract] Ryazan Planning and Technological Institute has developed an experimental model production line for galvanic metallization of printed circuit boards, designed for application of copper and tin-lead alloy to PC boards manufactured by the combined positive and semiadditive methods. The line is now being introduced at the Schetmash Plant in Kursk. The Institute has also developed an experimental model of a PC board galvanic copper plating line, the model A98. Both devices are designed to improve the quality of galvanic coating of PC boards by maintaining constant levels of solutions in the baths and solution temperatures, controlling pressure and consumption of electrolytes, monitoring and regulating current density in the galvanic baths, monitoring water pressure and air pressure in water and air lines, and synchronizing the movement of manipulators. These parameters are monitored and controlled using local automatic control devices based on an SM 1800 computer. Operating modes include manual, manual with precise positioning, automatic and automatic under the control of a process control system. [161-6508]

UDC 518.5

COORDINATE CONVERSION ALGORITHMS FOR MICROPROCESSORS

Leningrad IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: PRIBOROSTROYENIYE in Russian Vol 28, No 5, May 85 (manuscript received 11 Oct 84) pp 34-39

N. S. Anishin, Kubanskiy State University

[Abstract] Algorithms are proposed and validated for converting Cartesian coordinates to polar and back that do not entail multiplication or division or sets of constants. The conversion procedures are based on digital circular interpolation algorithms that have been refined by the author. The systematic error of the circular interpolation algorithms is half that of other known algorithms, and their accuracy is the maximum possible for digital interpolation. The proposed algorithms are feasible for use in microprocessors and microcomputers employing 8- or 9-bit initial data. The algorithms can be employed, e.g., in phase systems for controlling electric devices, electrical, and radio systems that incorporate units that work in accordance with the relationships in vector diagrams describing electromagnetic processes, such as automatic frequency control units, adaptive filters, etc. Figures 2; tables 1; references 3: 2 Russian, 1 Western.
[6900/152]

UDC 681.323

ORGANIZATION OF SPECIAL-PURPOSE COMPUTATIONAL STRUCTURES FOR SOLVING COMBINATORY-LOGIC PROBLEMS IN NETWORKS EMPLOYING MICROCOMPUTERS

Kiev ELEKTRONNOYE MODELIROVANIYE in Russian No 6, Nov-Dec 85 (manuscript received 6 Apr 84) pp 14-20

A.G. Dodonov, L. I. Minchenko, S.P. Pelekhov, N. A. Ruban and N.M. Sasyuk

[Abstract] The use of networks, defined as graphs on whose elements functions are assigned, to describe combinatory logic systems is described. The application of a class of network problems in constructing efficient computing structures is analyzed. A computational field is presented that implements the functions corresponding to the nodes of a network; the data field is

used to generate the signals that are sent to the other devices. Computational structures for network analysis employing static and dynamic distribution of decision elements among the branches of the modeled process are compared. Structures employing dynamic distribution are found to be most sophisticated, and can be implemented in hardware with fixed algorithms, or by software using microcomputers. Figures 6; references 9: 8 Russian, 1 Western.
[6900/160]

UDC 681.01.3:51

ORGANIZATION OF SELF-DIAGNOSING LSI MICROPROCESSORS

Kiev ELEKTRONNOYE MODELIROVANIYE in Russian No 6, Nov-Dec 85 (manuscript received 10 Dec 82) pp 47-51

V. B. Smolov, S. T. Khvoshch and S. V. Surov

[Abstract] The basic organizational principles employed in built-in LSI self-diagnosing circuits are investigated. The use of chip-level diagnosis is simplest, because it eliminates the need for localizing faults. It is found that a signature analyzer should be used to accumulate the test results. In order to minimize the amount of built-in self-diagnosis equipment, microcircuits should be designed that allow for setting up the diagnostic mode by reconfiguring the LSI circuit. The diagnostic results must be output in serial, or serial-parallel code, and diagnostics should be initialized from the power test circuits or by external signals. Figures 3; references 12: 8 Russian, 4 Western.
[6900/160]

UDC: 681.327.2

SM COMPUTER AND AUTOMATED COMPUTER EQUIPMENT SYSTEM COMMUNICATIONS SITE TERMINAL SUBSYSTEM MEMORY DEVICE

Moscow PRIBORY I SISTEMY UPRAVLENIYA in Russian No 12, Dec 85 pp 22-24

N.I. Velichko, I.A. Dichka, M.M. Saik, N.I. Khromova, M.S. Finkelsteyn, and Yu.I. Statylko, engineers

[Abstract] A description is presented of the SM 1634.3512 memory unit for use in terminal subsystems. The memory unit can be connected to any terminal subsystem through its standardized communications interface and to a microprogrammed controller through its microinstruction interface. Up to 64 K 16-bit words can be stored in the memory unit. Dynamic semiconductor RAM chips are used. The process of testing the memory unit with standard test devices is described. Figures 4, references: 2 Russian.
[161-6508]

UDC: 681.327.2-185.4

STATIC RAM FOR THE ELEKTRONIKA-60 MICROCOMPUTER

Moscow PRIBORY I SISTEMY UPRAVLENIYA in Russian No 12, Dec 85 pp 24-25

S.N. Belyayev and S.M. Matyushonok, engineers

[Abstract] Refreshing dynamic RAM in the Elektronika-60 occupies 7.5% of CPU time. Furthermore, the type 565 dynamic RAM chips used in the memory system consume so much power that battery operation of the computer is impossible. The Siberian Institute of Terrestrial Magnetism, the Ionosphere and Propagation of Radio Waves has developed a static RAM unit for the Elektronika-60 based on KR537RU2A CMOS 4 K chips. A photograph of a memory board is presented. The starting address and board capacity (4-16 K) are jumper selectable. Experimental testing has determined that the memory unit can store information for at least six months when supplied with at least 3.5 V dc power. Figure 1, references: 2 Russian.
[161-6508]

ELECTRON DEVICES

"SPIN GLASS" STATES IN GALLIUM-ARSENIDE

Leningrad FIZIKA I TEKHNIKA POLUPROVODNIKOV in Russian Vol 19, No 10, Oct 85 (manuscript received 10 Apr 85) pp 1867-1869

V.F. Masterov, S.B. Mikhrin and K.F. Shtelmakh, Leningrad Polytechnical Institute imeni M. I. Kalinin

[Abstract] "Spin glass" states in $A^{III}B^{V}$ semiconductors are detected by electron paramagnetic resonants. Spectrum measurements were made on gallium arsenide specimens in the X band using an ER-220D-LR spectrometer. Comparison of the experimental findings with the results of an investigation of ordinary spin glasses indicated that an analogous state was observed in a doped semiconductor. The investigations indicate that disordered regions of sufficiently large dimensions are formed during strong doping in the system in question, and these regions can have a strong influence on the electrical and magnetic properties of the crystals. The crystals can be used as model objects in investigating the interaction of magnetic moments in disordered systems. Figures 2; references 4: 2 Russian, 2 Western.
[6900/141]

UDC 621.385.832

ELV 200/1 U2 ELECTRON-BEAM TUBE

Moscow ELEKTROTEKHNIKA in Russian No 11, Nov 85 (manuscript received 9 Jan 85) pp 62-63

G.I. Maltsev, candidate of physical-mathematical sciences, B.I. Ubiyennykh, A.P. Borodkin, Ye.A. Radzinskiy, and R. V. Pakhmanulov, engineers, Minusinsk Department of All-Union Electrotechnical Institute imeni V.I. Lenin

[Abstract] The basic characteristics are presented for the ELV 200/1 U2 [rectifier] tube, a high-voltage electrovacuum device of the triode type, the electron-optical system (EOS) of which includes a thermionic cathode, a control electrode, and an anode. A feature of the ELV 200/1 U2 is that the EOS permits operation in a regime retarding the electron flow at the anode and thereby assuring high efficiency. A photograph is shown of the exterior form and possible variations of the cooling system. Figures 1; references: 5 Russian.
[158-6415]

UDC 681.5

DIGITAL AUTOMATIC CONTROL SYSTEMS WITH INPUT DATA COMPRESSION

Novocherkassk IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: ELEKTROMEKHANIKA in Russian No 8, Aug 85 (manuscript received 26 Mar 85 after revision) pp 80-86

Yu. M. Gusev, V. A. Semeran and V. P. Kuznetsov

[Abstract] This study investigates the effectiveness of data compression procedures in digital multichannel automatic control systems in order to minimize the speed required of the digital control machine, which is specified during the design phase on the basis of worst-case and improbable conditions. The use of compression algorithms in digital control systems is analyzed. In addition to relaxing the speed requirements of the digital controller, data compression makes it possible to reduce the volume of input data, allowing the computer to use the time saved in order to improve fault-tolerance by implementing test programs. Because data compression lengthens the average decision period, the probability that a fault will occur while a control input is being computed is reduced, thus improving the noise tolerance of the system. Figures 5; references 2: 1 Russian, 1 Western.
[6900/148]

UDC [62-503.51.3.024:681.32].001.4

CHOICE OF PARAMETERS OF DIRECT CURRENT SERVO DRIVE WITH DIGITAL CONTROL

Moscow ELEKTROTEKHNIKA in Russian No 11, Nov 85 (manuscript received 3 Jan 85) pp 2-4

V.M. Terekhov, doctor of technical sciences, and Ye. N. Panov, engineer, Moscow Power Engineering Institute

[Abstract] The study conducted makes it possible: 1) To distinguish the characteristic functional zones of servo drives (SD) with digital control; 2) To determine the quantitative boundary of the linear adequacy of digital and analog SD; and 3) To substantiate the requirements for word length of the computers and the elements of the control circuits for the principal

coordinates, which gives a basis for a choice of the digital elements in a SD control system. Figures 5.
[158-6415]

UDC [621.316.923:621.314.572].001.3

USE OF SAFETY FUSES FOR PROTECTION OF HIGH-VOLTAGE VOLTAGE INVERTERS

Moscow ELEKTROTEKHNIKA in Russian No 11, Nov 85 (manuscript received 16 Nov 84) pp 9-12

I.M. Kruglyanskiy and G.S. Medvedeva, candidates of technical sciences, All-Union Scientific-Research, Planning and Design Institute for Automatic Electric Drive in Industry, Agriculture and Transportation

[Abstract] The possibility is studied of protecting high-voltage self-excited voltage inverters (SEVI) by series low-voltage safety fuses (SF). The experimental studies were conducted on a full-scale stand, and the calculations made with the aid of an RC-model of the arc of the safety device. A variation is considered of the SF unit in a branch of the capacitor bank with possible by-passing of its reactor for lightening working conditions and enlarging the field of application of the SF. Such a solution possesses a number of advantages, i.e., the mass and dimensions of the reactor are substantially decreased, and the reactor does not participate in the operating process and depends on admissions of part of the impulse of the breakdown current. The SF is only selected on the basis of the reactive load current and can be realized by reduced voltage and switching capacity ability. Figures 6; tables 2; references: 2 Russian.
[158-6415]

UDC [62-83:621.313.13-133.32].001.3

CONTEMPORARY STATE AND PROSPECTS FOR DEVELOPMENT OF CONTROL UNITS FOR MULTIPHASE STEP-BY-STEP ELECTRIC MOTORS

Moscow ELEKTROTEKHNIKA in Russian No 11, Nov 85 (manuscript received 31 May 84) pp 19-21

V.Sh. Arutyunyan, candidate of technical sciences, A.Z. Muradyan, V. Ye. Girgoryev, M.M. Minkin and Yu.V. Borzyak, engineers, Machine Apparatus Plant

[Abstract] An analysis of the state of contemporary control units (CU) for step-by-step electrical motors (SSEM) produced by domestic industry demonstrates their noncontemporary scientific-technical level of performance. The possibilities and means for development of CU for SSEM are outlined, as well as future scientific-technical problems. The prospects for growth of three of the principal units of the CU for SSEM are considered: 1) Pulse

distributors; 2) Devices providing electrical subdivision of spacing; and 3) Power amplifiers. Figures 1; references: 4 Russian.
[158-6415]

UDC 681.514

QUADRATURE SIGNAL GENERATORS

Leningrad IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: PRIBOROSTROYENIYE in Russian Vol 28, No 5, May 85 (manuscript received 4 May 84) pp 29-33

S.I. Ziatdinov and A. V. Pokrovskiy, Leningrad Institute of Aviation Instrument Engineering

[Abstract] The error introduced by a Hilbert ($\pi/2$) converter and a delay line in generating a quadrature signal is estimated. The measure of the error of the Hilbert transform, as well as of the delay line, is the deviation of the cross-correlation function of the quadrature component and the quadrature correlation function. It is found that Hilbert transformation and delaying the signal introduce large errors when forming quadrature signals. Delaying the signal in order to form the quadrature component is significantly less accurate than Hilbert transformation. The ratio of the center frequency to the spectral density width must exceed 10, which is the case only for narrow-band signals, in order to obtain satisfactory results with either method. Figures 1; references: 2 Russian.
[6900/152]

UDC 621.52

CONTROLLING MIRROR OF SURVEILLANCE AND DATA SYSTEM SERVING TRANSPORTATION ROBOT

Leningrad IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: PRIBOROSTROYENIYE in Russian Vol 28, No 5, May 85 (manuscript received 4 July 84) pp 48-51

V.A. Konoplev, Leningrad Shipbuilding Institute

[Abstract] A general method is proposed for constructing the program that controls the sections of the surveillance and data system serving a transportation robot. The surveillance system employs a laser whose beam is aimed toward the ground by a mirror; the control program must be capable of stabilizing the mirror, and thus the laser beam. The proposed method for investigating the kinematics of the surveillance and data system was tested successfully in practice. Figures 1; references: 4 Russian.
[6900/152]

UDC 629.7.062

INVESTIGATION OF HIGH-PRECISION ALIGNMENT DRIVES

Leningrad IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: PRIBOROSTROYENIYE in Russian Vol 28, No 7, Jul 85 (manuscript received 17 Oct 84) pp 18-21

S.V. Bystrov, V.I. Erashov and P.V. Nikolaev, Leningrad Institute of Precision Mechanics and Optics

[Abstract] A series of high-precision electromagnetic and piezoceramic drives developed by the authors is described. The electromagnetic drives (type ME and ME-02) consist of a cylindrical magnetic conducting housing surrounding three or four magnetic conducting rods to which the drive control coils are secured. The piezoceramic drives consist of a thin current conducting membrane that fits in a housing to which polarized piezoceramic washers are glued, with the controlled object secured to a rod in the center of the membrane. The static characteristics of the devices are measured on a system based on a Michaelson interferometer, and exhibit hysteresis behavior. The amplitude-frequency characteristics of the drives are compared, indicating that each type of drive represents a resonate system. The findings of a computer simulation, as well as the experimental data, confirm the theoretical conclusions drawn previously regarding such devices. Figures 4; references: 6 Russian.
[6900/156]

UDC 681.323

DIGITAL ANALOGS IN INVESTIGATIONS OF LINEAR DYNAMIC SYSTEMS

Kiev ELEKTRONNOYE MODELIROVANIYE in Russian No 6, Nov-Dec 85 (manuscript received 17 Apr 84) pp 43-46

N. V. Fedotov

[Abstract] Methods based on the mathematical apparatus of graph theory for investigating linear dynamic systems are investigated. The methods make it possible to represent the equations for the branches of the dynamic system numerically and analytically in canonical form. The representation process is based on decomposition of the graph of the dynamic system into elementary operations of signal conversion, such as amplification, integration, differentiation, delay, etc. The use of a digital analog, which represents a uniform modeling structure that reproduces the configuration of the original graph by computation of the elementary processors, is described. The use of digital analogs in conjunction with computers in investigating technical systems makes it possible to perform the investigation interactively, inasmuch as the problem solving time is on the order of hundreds or thousandths of a second. Figures 1; references 6: 4 Russian, 2 Western.
[6900/160]

UDC: 681.782.44

DIGITAL PHOTOELECTRIC INTERFEROMETER

Moscow PRIBORY I SISTEMY UPRAVLENIYA in Russian No 12, Dec 85 pp 15-16

V.P. Babenko, G.R. Levinson, candidates of technical sciences, S.I. Barabanov, V.A. Gorbarenko, engineers, and N.N. Yevtikhiyev, corresponding member, USSR Academy of Sciences

[Abstract] An automated system is described for measurement of the position and movement of the achromatic band in a white light interferometer resulting from the measured displacement. The optical interferometer provides fully automated processing of information and presentation of results in digital form. Information on the position of the achromatic band is obtained by time conversion of the static interference picture to a periodic electrical signal. This reduces visual measurements in space to time measurements of electrical signals. Automatic averaging of 100 measurements, requiring about 2-1/2 seconds, yielded errors in measurement of the distance between bands of not over 0.2 nm, error of measurement of position of center of achromatic band 0.5 nm, error of measurement of change in interferometer arm path difference 3-5 nm. These results could be significantly improved by increasing the signal/noise ratio following the photoreceptor and by using a modulator with more linear characteristics. Figures 2, references: 8 Russian.
[161-6508]

UDC: 681.513.2

CONTROL DEVICE BASED ON MK-01 MICROCONTROLLER

Moscow PRIBORY I SISTEMY UPRAVLENIYA in Russian No 12, Dec 85 pp 25-26

N.I. Kryazhev, A.A. Trushin, E.L. Chuvashov, G.G. Yemelin and Y. Ya. Pogodayev

[Abstract] A description is presented of a control device based on the MK-01 controller, a low-level local control device, a part of a process control system for application of resistive layers. The device can switch electric motors, couplings or conveyor control devices and can control the position of actuating organs. It can operate automatically, under the control of a higher level computer, or manually, controlled by an operator from the front panel. An adjustment mode is also provided. The MK-01 microcontroller is based on a type KR580IK80A microprocessor, and is a bus-based device. The control program is stored in 6 K bytes of ROM. The program operates by issuing instructions to actuating devices, then waiting for a signal indicating completion of each instruction before the next is issued. If a time-out occurs before receiving the signal that an instruction has been performed, the control program jumps to an emergency situation handling section which outputs a report and awaits an 'abort, retry' or ignore (continue)' signal.
[161-6508]

UDC: 681.326.73

KPUI-16 KEYBOARD CONTROL AND DISPLAY PANEL

Moscow PRIBORY I SISTEMY UPRAVLENIYA in Russian No 12, Dec 85 pp 27-28

A.I. Syzdaltsev, candidate of technical sciences

[Abstract] The KPUI-16 keyboard control and display panel was developed by the AVTOGRAF Scientific-Production Association in Orel. Designed for use in the KURS-2 system, it can also be used in other environmental control systems for buildings. The device controls access to the environmental control system, receives instructions for operation of the HVAC, electric power, water supply and other systems of the building, and displays information concerning the status of the system on a 1-line, 16 character display. The MTBF of the device is 10,000 hours, power consumption 15 W, dimensions 430 x 400 x 120 mm. The device is similar to the Honeywell Delta-2000 controller. A future report will describe information processing modes, information structure, signals used to exchange information with other devices, structure and codes of control commands and the design of the device. Figures 2, references 3: 2 Russian, 1 Western.
[161-6508]

UDC: 681.3:51.007.001.893

FORMALIZED AUTOMATED ESTIMATION OF ACTIVITY AND RANKING OF SCIENTIFIC RESEARCH INSTITUTES AND DESIGN BUREAUS

Moscow PRIBORY I SISTEMY UPRAVLENIYA in Russian No 12, Dec 85 pp 38-39

Ye.V. Volkov, engineer, and Ye.P. Bocharov, candidate of economic sciences

[Abstract] Scientific research institutes and design bureaus can be evaluated by comparing results among similar organizations. This method is used to administer organizations of the Ministry of Instrument Building, based on automatic evaluations of their activity. A quantitative evaluation is generated by computational and logical procedures applied to a broad spectrum of indices characterizing the major aspects and goals of the scientific-technical, financial-economic, organizational and other activities of research institutes and design bureaus. The AKKORD-NS system automatically generates evaluations and transmits them to the Ministry. The use of the system has indicated that these evaluations are effective in stimulating organizations to improve their operations so as to achieve better rankings. Evaluations are based on a calculated effectiveness coefficient which includes effectiveness, reliability, plan effectiveness, rate of increase in effectiveness, level of completed work, output per employee and safety grade. Figures 4, references: 2 Russian.
[161-6508]

UDC 621.317.33

SYNTHESIS OF EDDY CURRENT DEVICE WITH SUPPRESSED INFLUENCE OF UNCONTROLLED PARAMETER OF ARTICLE

Leningrad IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: PRIBOROSTROYENIYE in Russian Vol 28, No 5, May 85 (manuscript received 12 Nov 84) pp 58-62

Yu. I. Steblev, Kuybyshev Aviation Institute imeni S. P. Koroleva

[Abstract] This study examines the synthesis of eddy current devices using the required relationship between the output signal and the measured quantity considering changes of one of the uncontrolled parameters of the article. The synthesis problem boils down to determining the characteristics of the sounding signal produced by the eddy current converter. A regularized synthesis equation is derived that makes it possible to determine the parameters of a sounding signal with the minimum possible power from the output characteristic as a function of the measured quantity with interference due to changes in an uncontrolled parameter of the article. An eddy current device with a linear output characteristic is calculated numerically as an example. The approach can be extended to the synthesis of eddy current devices for two or more interfering parameters of the article. Figures 1; tables 1; references: 5 Russian.
[6900/152]

UDC 621.317.722

CONTROL CIRCUITS FOR LIGHT-EMITTING NEURISTORS IN HIGH-PRECISION SCALE INDICATORS

Leningrad IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: PRIBOROSTROYENIYE in Russian Vol 28, No 7, Jul 85 (manuscript received 2 Apr 84) pp 7-12

V. V. Gaytan and N. T. Gurin, Ulyanovsk Polytechnical Institute

[Abstract] Circuits are proposed for controlling light-emitting neuristors that convert the measured voltage to a proportional number of pulses, or a digital code, in order to improve the measurement accuracy of scale indicators. Two scale indicator versions are proposed, one employing a light-emitting

neuristor in which the neuristor pulse of the next cell of the light-emitting neuristor corresponds to each supply voltage pulse, and another that employs an analog - supply pulse length converter with a digital comparison circuit. Both versions can be used to build scale indicators in which the measurement error is determined by the number of neuristor cells. If there is no limit on the number of cells, the measurement accuracy is determined by the error of the control circuit, and can be as low as a few tenths of a percent. Figures 4; references: 9 Russian.
[6900/156]

UDC: 621.314

NEW SERIES OF ELECTRICAL PARAMETER MEASUREMENT INSTRUMENTS

Moscow PRIBORY I SISTEMY UPRAVLENIYA in Russian No 12, Dec 85 pp 21-22

R.I. Agrest, N.P. Tveritin, K.A. Mindglina and A.I. Diber, engineers

[Abstract] A new series of measurement instruments have been developed at the Vitebsk Electric Measurement Instruments Plant: the Ye851 summary direct current meter; the Ye854 alternating current meter; the Ye855 ac voltmeter; the Ye856 dc voltmeter; the Ye857 dc voltmeter; the Ye858 ac frequency meter; the Ye859 active three-phase power meter; and the Ye860 reactive three-phase power meter. The new devices have improved conversion accuracy in comparison to the old Ye824-Ye831 devices, measurement time 0.5 s, mass reduced by a factor of 4 to 5, power consumption by a factor of 2 to 3, dimensions reduced to 110 x 120 x 117 mm, service life increased to 10 years. All the new devices are in improved dust resistant cases designed for rack mounting can operate at -30 to + 603C (+503C for the Ye851, Ye858-Ye860), are vibration resistant and can tolerate interruptions in input and load circuits. The new instruments successfully passed experimental operation in the first quarter of 1984. Reference: 1 Russian.
[161-6508]

UDC 621.317.4.088.3

APPLICATION OF KALMAN FILTERING IN MAGNETIC MEASUREMENTS

Leningrad IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: PRIBOROSTROYENIYE in Russian Vol 28, No 7, Jul 85 (manuscript received 29 Oct 84) pp 3-7

N. V. Zakhirko, Omsk Polytechnical Institute

[Abstract] A method is proposed for enhancing the accuracy of measurements of the magnetic characteristics of materials in the presence of significant external random noise that employs the mathematical apparatus of recursive Kalman estimation. The Kalman procedure is used to obtain optimal estimates of the measurements of the increments of the magnetic field strength and the magnetic flux in a system designed for magnetizing a tested specimen by a stepwise-varying magnetic field. This algorithm is unique in that the linear mathematical model that describes the full specimen magnetization cycle is replaced by a sequence of linear models based on piecewise-linear approximation of a curve, with the number of linearized segments of the curve corresponding to the number of stages of the magnetizing signal. The use of the recursive filtering algorithm for processing the results of magnetic measurements is analyzed. It is found that the Kalman estimation algorithm is useful in that it increases the accuracy of reproduction of the characteristics of ferromagnetic materials. Figures 1; references: 4 Russian.
[6900/156]

UDC 621.3.011

SQUID-BASED MAGNETOMETER

Leningrad IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: PRIBOROSTROYENIYE in Russian Vol 28, No 7, Jul 85 (manuscript received 22 Oct 84) pp 53-60

V.N. Polushkin, Tomsk Polytechnical Institute imeni S. M. Kirov

[Abstract] Multidimensional Markov analysis is employed to investigate the statistical dynamics of a SQUID-based magnetometer incorporating a singly-coupled integrator in its loop. In contrast to a first-order system, SQUID-based magnetometers exhibit an increase in the influence of noise effects as the loop gain increases for the same passband boundary frequency. The expressions derived can be used to synthesize SQUID-based magnetometers with optimal characteristics. Figures 5; references 8: 6 Russian, 2 Western.
[6900/156]

UDC 621.372.2.052.3

CURRENT AND VOLTAGE WAVES IN MULTICONDUCTING SHIELDED MICROSTRIP LINES

Novocherkassk IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: ELEKTROMEKHANIKA in Russian No 11, Nov 85 (manuscript received 9 Jan 84) pp 5-15

Sergey Vasilyevich Muchenko, candidate of technical sciences, assistant professor, and Khachik Ovanesovich Kazandzhyan, engineer, Taganrog Radio Engineering Institute

[Abstract] The electrodynamic theory of shielded microstrip lines presented in previous papers by Muchenko (1983), and Muchenko/Kazandzhyan (1984) is basically completed. For the case of superhigh frequencies when it is impossible to disregard dispersion in microstrip lines, concepts are introduced with respect to current and voltage waves. The wave impedances are determined for these waves. A complex of programs is compiled in FORTRAN IV algorithmic language, which makes it possible by the methods discussed to analyze by an approximation of the Quasi-T-wave, the various microwave devices fulfilled on shielded microstrip lines with two- and three-ply dielectric filling. In order to illustrate the proposed approach, a program was compiled in FORTRAN IV language for calculation of the dispersion characteristics of a two-conductor shielded microstrip line with a two-ply dielectric filling. A table presents the results of a calculation with respect to two variations of the line's dimensions. Tables 3; references: 4 Russian.
[164-6415]

UDC 534.222.2:666.665+666.652

GENERATION OF SECOND HARMONIC OF SURFACE ACOUSTIC WAVE IN PIEZODIELECTRIC-GAP-SEMICONDUCTOR STRUCTURE

Moscow AKUSTICHESKIY ZHURNAL in Russian Vol 31, No 4, Jul-Aug 85 (manuscript received 3 Apr 84) pp 433-438

A.L. Belosmotskiy and L.A. Fedyukhin, Institute of Semiconductor Physics, Siberian Department, USSR Academy of Sciences

[Abstract] The generation of the second harmonic of a Rayleigh wave in a piezodielectric-gap-semiconductor structure is analyzed using the approximation of an assigned field assuming two types of charge carriers in the semiconductor, with no contact between the piezodielectric and the semiconductor. The nonlinear parameter of the second harmonic generation is analyzed numerically as a function of the electrophysical properties of the layered structure. All other conditions being equal, it is found that the efficiency of second harmonic generation in a structure with a monopolar semiconductor is significantly higher than in a structure with a near-intrinsic semiconductor. The absolute value of the nonlinear parameter of second harmonic generation becomes zero in the limiting case of an intrinsic semiconductor with equal electron and hole mobility. Because there is no bulk charge wave, the second harmonic of the surface acoustic wave is not generated. Figures 2; references 7: 3 Russian, 4 Western.
[6900/149]

UDC 621.372.81.001.24

ANALYSIS OF WAVEGUIDES WITH MINOR SINUSOIDAL AND CONTINUOUS PERTURBATION OF PARAMETERS

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 30, No 10, Oct 85 (manuscript received 5 May 83) pp 1873-1878

V.F. Borulko

[Abstract] Resonant wave interaction is analyzed in slightly irregular waveguides with small sinusoidal and continuous perturbation of parameters by an asymptotic method whose zero-order approximation is equivalent to coupled wave theory, and whose higher-order approximations are obtained by the Krylov method. Electromagnetic wave propagation in a rectangular corrugated waveguide is investigated. The coefficient of reflection of H_{10} waves from a corrugated section of a rectangular waveguide is investigated. The method can also be used for waveguides with other configurations. Figures 1; references 14: 10 Russian, 4 Western.
[6900/136]

UDC 535.853.4

MILLIMETER-BAND RAD SPECTROMETER EMPLOYING SOLID STATE REFERENCE FREQUENCY SYNTHESIZER AND INVESTIGATION OF H_2CO LINE SHIFT

Gorkiy IZVESTIYA VYSSHIKH UCHENNYKH ZAVEDENIY RADIOFIZIKA in Russian Vol 28, No 11, Nov 85 (manuscript received 4 Dec 84) pp 1382-1391

Yu. I. Alekhin, G. M. Altshullev, N. F. Zobov, Ye. N. Karyakin, M.I. Kirillov and A. F. Krupnov, Institute of Applied Physics, USSR Academy of Sciences

[Abstract] A microwave spectrometer operating in the 4-millimeter band with a solid state reference frequency synthesis system (microwave synthesizer) is described; initial results of investigations employing it are cited. The block diagram of the RAD spectrometer is presented, and the basic specifications are tabulated. Test measurements of the known N_2O lines were made in order to check the accuracy of the system. The test measurements indicated that the measured and tabular frequencies of the lines coincide to within 0.2 MHz. It was also found that the frequency control accuracy of the backward wave tube was significantly better than the accuracy with which the spectral line frequencies were measured. The use of the spectrometer to investigate pressure shifts of the spectral lines of molecules is described. The spectrometer can be used for regular spectroscopic research, and can also serve as the basis for developing an improved version of the RAD spectrometer, as well as a special-purpose spectrometer for measuring pressure line shifts in order to investigate the properties molecules, intermolecular interactions, and chemical analysis. Figures 6; tables 2; references 16: 11 Russian, 5 Western.
[6900/163]

UDC 537.874.6

NON-MIRROR WAVE REFLECTION BY WAVEGUIDE-TYPE DIFFRACTION GRATINGS. GENERAL PRINCIPLES

Gorkiy IZVESTIYA VYSSHIKH UCHENNYKH ZAVEDENIY RADIOFIZIKA in Russian Vol 28, No 11, Nov 85 (manuscript received 30 Oct 84) pp 1450-1461

A.A. Kirilenko, A.P. Kusaykin and Yu. K. Sirenko, Institute of Radio Physics and Electronics, Ukrainian SSR Academy of Sciences

[Abstract] A detailed investigation is made of the influence of excitation modes on the nature of complete non-mirror reflection effects. The possibility of controlling the figure of merit by changing the profile and filling the channels of the grating is analyzed, and the behavior of the near fields and phase characteristics are studied. Non-mirror reflection effects can be used in open resonators with frequency-selective mirrors, and in the development of various types of waveguide devices such as band-rejection filters employing autocollimation reflection of Brillouin waves, wave type converters, short adapters between waveguides with different cross-sections, etc. Figures 8; references 9: 4 Russian, 5 Western.
[6900/163]

UDC 621.317.37

REMOVAL OF POLARIZATION DEGENERATION IN OPEN RESONATORS WITH ASTIGMATIC REFLECTORS

Gorkiy IZVESTIYA VYSSHIKH UCHENNYKH ZAVEDENIY RADIOFIZIKA in Russian Vol 28, No 11, Nov 85 (manuscript received 17 Aug 84) pp 1482-1485

V.P. Androsov, Institute of Radio Physics and Electronics, Ukrainian SSR Academy of Sciences

[Abstract] The processes underlying the formation of polarization structure of the field in an astigmatic open resonator are investigated. A dispersion equation is derived for the fundamental $TEM_{\phi\phi q}$ oscillation in an astigmatic resonator that takes into account the vector nature of the electromagnetic field. The polarization properties of the resonator are investigated theoretically and experimentally. The degree to which the polarization degeneration in the astigmatic resonator for the fundamental oscillation $TEM_{\phi\phi q}$ depends little upon the subscript q, and is determined mainly by the ratio of the radii of curvature of the astigmatic mirror. The theoretical and experimental results are found to agree well. Figures 3; references: 7 Russian.
[6900/163]

UDC 535.31-621.375.82

STOCHASTIC DYNAMICS OF BEAMS IN WAVEGUIDE RESONATORS

Gorkiy IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOFIZIKA in Russian Vol 28, No 10, Oct 85 (manuscript received 9 Aug 84) pp 1266-1273

S. S. Abdullaev, Tashkent State University

[Abstract] An investigation is made of nonlinear beam resonance and stochastic beam instability in waveguide resonators. The use of Hamilton dynamics makes it possible to examine beam dynamics in resonators with arbitrary aberration. The conditions under which nonlinear resonance and stochastic instability occurs in the presence of weak regular inhomogeneities of the medium are investigated. A waveguide resonator with a stepped cross-sectional profile containing a thin lens is analyzed as an example. Figures 1; references: 9 Russian.
[6900/151]

UDC 621.385.6

INVESTIGATION OF FINE STRUCTURE OF DIFFRACTION RADIATION IN MILLIMETER BAND. I

Gorkiy IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOFIZIKA in Russian Vol 28, No 10, Oct 85 (manuscript received 7 Aug 84) pp 1274-1283

A.A. Vertiy, I.V. Ivanchenko, A.V.Nesterenko, N.A. Popenko, A.I. Tsvyk, L.I. Tsvyk and V.P. Shestopalov, Institute of Radio Physics and Electronics, Ukrainian SSR Academy of Sciences

[Abstract] This study investigates the conditions underlying the excitation of diffraction radiation by longitudinal and transverse electron waves. A quasi-optical complex is described that operates in the millimeter band and can be used to study the characteristics of diffraction radiation excited by a modulated electron beam moving near a diffraction grating. "Cold" modeling of the electron-wave processes is used to indicate the practical capabilities of the diffraction radiation analyzer. It is found theoretically that there is a region of change of the parameters of the electrodynamic system and electron stream for which diffraction radiation is excited by one or several electron waves propagating at different phase velocities. Figures 6; references 11: 10 Russian, 1 Western.
[6900/151]

UDC 537.874.4

RIGOROUS THEORY OF OPEN TWO DIMENSIONAL RESONATORS WITH DIELECTRIC INHOMOGENEITIES

Gorkiy IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOFIZIKA in Russian Vol 28, No 10, Oct 85 (manuscript received 2 Jul 84) pp 1311-1322

V.N. Koshiarenok, P.N. Melezhik, A. Ye. Poyedinchuk and V.P. Shestopalov, Institute of Radio Physics and Electronics, Ukrainian SSR Academy of Sciences

[Abstract] A rigorous mathematical model is constructed that describes the spectral characteristics of two-dimensional open resonators with mirrors that coincide with parts of closed round cylindrical surfaces and with an inhomogeneity in the form of a round dielectric cylindrical surface. An approach is developed for the constructive solution of the two-dimensional problem of diffraction of assigned H- and E-polarized monochromatic electromagnetic fields on a structure consisting of an open resonator with a dielectric inhomogeneity. An algorithm is constructed for calculating the eigenfrequencies based solely on the existence of isolated characteristics of the numbers of the operator-function I-A(k). It is shown analytically that there exists an optimal dimension of the dielectric probe for the reactive resonator sounding method. Figures 5; references 14: 11 Russian, 3 Western.
[6900/151]

UDC 621.38

ANALYSIS OF AUTOMODULATION INSTABILITY OF GYROTRON RADIATION

Gorkiy IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOFIZIKA in Russian Vol 28, No 10, Oct 85 (manuscript received 23 Jul 84) pp 1323-1330

G.S. Nusinovich, Institute of Applied Physics, USSR Academy of Sciences

[Abstract] A theory is presented that makes it possible to analyze the conditions underlying automodulation instability of gyrotrons with soft self-excitation for an arbitrary mode frequency separation and arbitrary longitudinal structure of the RF field of the resonator. The investigation demonstrates the possibility of analyzing the influence of the parameters of electron masers with near-equidistant resonator frequency spectrum on automodulation instability. Figures 5; references 9: 6 Russian, 3 Western.
[6900/151]

UDC 621.136.933

FORMATION OF POWERFUL NANOSECOND RF PULSES IN THREE-CENTIMETER BAND

Gorkiy IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOFIZIKA in Russian Vol 28, No 10, Oct 85 (manuscript received 12 Dec 84) pp 1347-1348

V.A. Avgustinovich, S.A. Novikov, S. V. Razin and Yu. G. Yushkov, Tomsk Polytechnical Institute

[Abstract] A comparison is made of the duration and amplification of two pulse generators with a carrier frequency of 9.4 GHz based on rectangular resonators excited on H_{10n}-type oscillations. The resonator of the first generator consisted of a segment of a regular 23 x 10 mm^2 waveguide 800 mm long bounded on one end by the exciting element and on the other by a switching tee made of waveguides with the same cross-section. In order to reduce losses, the second generator employed an oversized 72 x 34 mm^2 resonator 710 mm long. The results indicate that the use of oversized accumulating volumes makes it possible to obtain high amplification of the pulse power at the system output in the 3-cm band. References 3: 1 Russian, 2 Western.
[6900/151]

UDC 621.316.542.027.3.001.3

VVTE-10-10/630 U2 AND VVTP-10-10/630 U2 HIGH-VOLTAGE VACUUM CIRCUIT-BREAKERS

Moscow PROMYSHLENNAYA ENERGETIKA in Russian No 11, Nov 85 pp 11-13

G.I. Maltsev, candidate of physico-mathematical sciences, A.M. Mikhleyev, engineer, V.N. Strelkov, engineer, and V.R. Susurkin, engineer, Minusinsk department, All-Union Institute of Electrical Engineering imeni V.I. Lenin

[Abstract] Two new high-voltage vacuum circuit-breakers have been developed by the All-Union Institute of Electrical Engineering in Minusinsk, and are since 1981 produced at the Minusinsk Circuit-Breaker Manufacturing Plant. Both are designed for frequent switching in 3-phase networks operating at 50 Hz or 60 Hz frequency with isolated neutral, the VVTE in a KRU cabinet with built-in components and the VVTP in KRU cabinet with draw-out components. They are both rated for 10 kV nominal and 12 kV maximum voltages, 630 A nominal operating current, 10 kA nominal disconnect current and 25 kA maximum peak reconnect current with an aperiodic component not larger than 60%. Their intrinsic disconnect time, arcing time, and reconnect time do not exceed 0.03 s, 0.02 s, and 0.1 s respectively, total disconnect time being not longer than 0.05 s. They can operate at altitudes up to 1000 m above sea level, at temperatures from -40°C to +50°C, in air with a relative humidity not exceeding 80% at 20°C, in a nonexplosive atmosphere but also in a class-II corrosive atmosphere. They can withstand single impact at a 3g acceleration for 2-20 ms, also roll and trim through 15° angles. Each circuit breaker includes a KVD-10-10/630 UKhL2 arc-quenching chamber. Each has a life expectancy of 25 years, unless the allowance for mechanical wear is exceeded after 20,000 disconnect-pause-reconnect cycles, and each is adaptable for operation with automatic reclosure. Figures 2; tables 3; references: 3 Russian.
[127-2415]

UDC (621.317.333:621.1.027.4).001.24

MICROCOMPUTER-AIDED CALCULATION OF PHASE-INSULATION RESISTANCES AND CAPACITANCE IN NETWORKS OF UP TO 1000 V RATING

Moscow PROMYSHLENNAYA ENERGETIKA in Russian No 11, Nov 85 pp 36-37

Yu. Ye. Babichev, candidate of technical sciences, and D.N. Chuchelov, engineer, Moscow Institute of Mining

[Abstract] A simple algorithm is constructed for calculating the insulation resistances and capacitance in 3-phase networks of up to 1000 V rating. The algorithm is subsequently programmed for calculation by Elektronika MK-54, MK-56, B3-34 microcomputers. The program includes a check run. Conductances can then be calculated not only in mhos but also in millimhos and micromhos. Figures 2; references: 2 Russian.
[127-2415]

UDC 621.316.1.027.5.015.38

SWITCHING OVERVOLTAGES IN 6-10 kV NETWORKS

Moscow PROMYSHLENNAYA ENERGETIKA in Russian No 11, Nov 85 pp 37-40

F.Kh. Khalilov, candidate of technical sciences, Leningrad Polytechnic Institute imeni M.I. Kalinin

[Abstract] Switching overvoltages in 6 kV and 10 kV networks were measured across transformers with or without connecting cables under no load, across 1.0-2.5 km long underground transmission lines and across 1.1-3.5 km long overhead transmission lines under no load, and across electric motors under no load. The instrumentation included an N-115 light-beam oscillograph and two devices for automatic recording of internal overvoltages, one of them a peak amplitude recording device, all connected through capacitive voltage dividers with KVI 1000 pF capacitors in the high-voltage arms. The data have been analyzed statistically, for estimating the number of overvoltages above the normal level occurring in one year, this number depending not only on the probability of such an overvoltage but also on the number of switching events. The statistical series were found to belong in the same general class of exponential functions. A comparative evaluation of the overvoltage distributions at the various network components reveals that only disconnecting transformers under no load is dangerous for fully insulated 6 kV equipment, while also disconnecting underground transmission lines under no load is dangerous for fully insulated 10 kV equipment. Disconnecting overhead transmission lines under no load is dangerous for 6 kV equipment and for 10 kV equipment with reduced insulation. Each switching of an electric motor degrades its insulation, inasmuch as any overvoltage above the test level accelerates its aging. Therefore, overvoltages during switching are generally more dangerous than overvoltages during arcing to ground and require installation of limiting devices. Figures 3; tables 4; references: 6 Russian.
[127-2415]

UDC 621.316.995.015.001.24

EQUALIZATION OF ELECTRIC POTENTIAL AROUND INDUSTRIAL BUILDINGS AND EQUIPMENT

Moscow PROMYSHLENNAYA ENERGETIKA in Russian No 11, Nov 85 pp 59-62

O.Yu. Zhukova, engineer, State Planning Institute for Petroleum Transporting Equipment, and Yu. F. Belousov, candidate of technical sciences, Volgograd department, All-Union Scientific Research and Heavy Industrial Electrical Equipment Design Institute imeni F. B. Yakubovskiy

[Abstract] A method of calculating the electric field distribution in industrial enterprises during single-phase faults is proposed, for evaluating the need to equalize the potential around them by embedding steel rings or strips 1 m below the surface and 1 m away from the foundation. Proximity factors have been calculated on the basis of the electrolytic-tank model for simple foundation shapes, cylinders and rectangular parallelepipeds. Into account is taken the effect of contact resistance between ground surface and man's feet in the absence of an asphalt pavement. The possibility of doing without such equalizers is demonstrated on a typical example of various objects in the field of a 110 kV network with a single-phase short circuit. Most vulnerable are found to be buildings with small foundations, but in some cases partial potential equalization at the corners will suffice. Figures 3; tables 3; references: 8 Russian.
[127-2415]

UDC 621.313

FINITE-ELEMENT CALCULATION OF THREE-DIMENSIONAL ELECTROMAGNETIC FIELD DURING CLEARLY DEFINED SURFACE EFFECT

Novocherkassk IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: ELEKTROMEKHANIKA in Russian No 8, Aug 85 (manuscript received 29 Jan 85 after revision) pp 11-17

V.A. Razmyslov

[Abstract] This study describes the use of the finite-element method to calculate three-dimensional electromagnetic fields with clearly manifested surface effect. The introduction of an unknown auxiliary vector defined by eddy currents, when the latter are present in the conducting media, can be avoided when the surface effect is strong by using approximate boundary conditions on the surface of the conductors, making it possible to calculate only the field without the conducting bodies. A system of equations is derived for the values of the scalar magnetic potential at the nodes of the finite-element grid. An example is presented in which the reverse synchronous electromagnetic field is calculated in order to investigate eddy currents and losses at the interface of the grooved wedges of the rotor of a turbine generator in asymmetrical operating modes. The method is found to be sufficiently accurate for practical purposes. Figures 4; references: 5 Russian.
[6900/148]

UDC 621.3.042.001.24

EFFECT OF ELECTROMAGNETIC FIELD ON A SPHERICAL SHELL SURROUNDING METAL BODY

Novocherkassk IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: ELEKTROMEKHANIKA in Russian No 8, Aug 85 (manuscript received 6 Dec 83) pp 17-23

S.M. Apollonskiy

[Abstract] A method is presented for calculating the shielding function and retroaction function of a thin-walled spherical shell with uniform electromagnetic parameters that contains a metal body within its cavity. The surrounded metal body is assumed to be spherical and hollow. Expressions are derived for the shielding function and retroaction function that can be used in the case of a ferromagnetic non-conducting or non-magnetic conducting spherical shell, or for a ferromagnetic non-conducting or non-magnetic conducting metal inclusion. An experiment is described that indicates that the proposed analytical method is sufficiently accurate for engineering purposes. Figures 2; tables 1; references: 11 Russian.
[6900/148]

UDC 621.313.33.001.5

INVESTIGATION OF EFFICIENCY OF INTERACTION BETWEEN CONDUCTOR AND INTERFERENCE ELECTROMAGNETIC FIELD

Novocherkassk IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: ELEKTROMEKHANIKA in Russian No 8, Aug 85 (manuscript received 30 Dec 83 after revision) pp 23-30

D. V. Makarenko

[Abstract] This study investigates the interaction of a conductor with the electromagnetic interference field formed by two fields exhibiting waves with mutually intersecting fronts, for which the wave front is nonlinear and the energy distribution of the resulting field along the wave front is nonuniform. The efficiency of interaction with the interference field of conductors of different length located along the front of H_{1m} and H_{2m} waves is analyzed by computer. The interaction with the resulting field of the electrical circuits of the stator and rotor of asynchronous electric motors is analyzed as an example. Figures 6; references 8: 6 Russian, 2 Western.
[6900/148]

UDC 621.313.313.8-181.48:537:612.001.24

MAGNETIZING FIELD IN DC ELECTRIC MOTORS WITH ANISOTROPIC CYLINDRICAL INTRA-ARMATURE MAGNET

Novocherkassk IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: ELEKTROMEKHANIKA in Russian No 8, Aug 85 (manuscript received 27 Feb 84) pp 46-51

Ye. V. Kononenko, V. B. Fursov and Yu. V. Pisarevskiy

[Abstract] A model is proposed for the two-dimensional magnetic field of a cylindrical permanent magnet in electric motors with hollow armatures. The proposed method, in which the magnetic field equations are solved approximately, makes it possible to analyze the magnetic system of an electric motor with a hollow armature containing a magnet made of YuNDK alloy with error not exceeding 10%. Figures 4; references: 3 Russian.
[6900/148]

UDC 621.314.26.001.5

ANOMALOUS OPERATING MODE OF DIRECT FREQUENCY-CONVERSION ELECTRIC DRIVE SYSTEM

Novocherkassk IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: ELEKTROMEKHANIKA in Russian No 8, Aug 85 (manuscript received 14 Feb 83) pp 101-104

S.N. Pavlovich

[Abstract] An anomalous operating mode is identified in direct frequency-conversion asynchronous motors in which the converter operates normally only up to a certain output voltage frequency; as that frequency increases, a breakdown occurs in which the load current is provided by only one of the rectifier groups and becomes unipolar, while the other group of rectifiers is no longer working. The influence of the frequency of the output voltage on the occurrence of this anomalous condition is investigated theoretically. The frequency values for which the anomalous operating conditions is most probable are identified by computer analysis. Figures 3; references: 4 Russian.
[6900/148]

UDC 622.242.5-83-592.3:550.822

DETERMINATION OF LOADS IN DRILLING COLUMN DURING RAISING AND LOWERING OPERATIONS

Novocherkassk IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: ELEKTROMEKHANIKA in Russian No 8, Aug 85 (manuscript received 21 Sep 84 after revision) pp 114-117

A. I. Tanatar and V. A. Uzhelovskiy

[Abstract] A method is presented for determining the influence of the parameters of an asynchronous drilling rig drive and the dynamic loading when the drill string is lowered in the dynamic braking mode. It is found that the rigidity of the drilling column and the cable exert the greatest influence on the dynamic loads. The proposed method for determining dynamic loads can be used in analyzing hoisting mechanisms consisting of an equivalent two-mass system with an elastic member. The experimental and theoretical figures agree sufficiently, except for an initial section lasting 0.1-0.15 sec. Figures 4; references: 6 Russian.
[6900/148]

UDC 621.314.21.045:538.311

CALCULATION OF ELECTRICAL FIELD AT EDGES OF CAPACITOR PLATES OF HIGH-VOLTAGE CURRENT TRANSFORMERS

Novocherkassk IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: ELEKTROMEKHANIKA in Russian No 11, Nov 85 (manuscript received 25 Apr 84) pp 15-22

Boris Vitalyevich Googe, junior research worker, Leonid Nisonovich Kontorovich, chief of laboratory, and Vladimir Kuzmich Kilevoy, chief of section, All-Union Institute of Transformer Construction (Zaporozhye)

[Abstract] Mathematical models are developed for evaluation of the effect of the constructional parameters of insulation on the electrical field at the edges of the capacitor plates of a high-voltage current transformer, with various means for their protection. The process includes choosing a calculated model of the insulation construction under investigation; formation of equations and boundary conditions, describing the electrical field in it; development of a method algorithm and program for solution of the equations; as well as conducting numerical investigations. The mathematical models developed can be used in the choice of effective methods for protecting the edges of capacitor plates. Figures 7; references: 7 Russian.
[164-6415]

UDC 621.313:621.3.01.016.1

TORQUE MOMENT OF AN ELECTRICAL MACHINE AS A FUNCTION OF THE ELECTROMAGNETIC FIELD OF A FINITE-ELEMENT MODEL

Novocherkassk IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: ELEKTROMEKHANIKA in Russian No 11, Nov 85 (manuscript received 28 Feb 84) pp 33-39

Pavel Georiyevich Popov, candidate of technical sciences, senior scientific-research worker, All-Union Scientific-Research Institute of Electromechanics, Moscow

[Abstract] The characteristic equivalences of the volumetric forces of an electromagnetic field to the tension forces in the air-gap of an electrical field are studied using the method of finite elements. Because errors accumulate during integration, the work established means to confine them to the level of errors characteristic of electromagnetic parameters. The answer to this problem could only be given by a series of numerical experiments. An idealized single-turn model (illustrated) and an asynchronous motor with a double cage in a starting regime served as the object of the numerical experiments. Figures 4; references 6: 5 Russian, 1 Western.
[164-6415]

UDC 621.313.713 (088.8)

CALCULATION OF THE ACTIVE ELEMENT OF A LINEAR ELECTRODYNAMIC MOTOR

Novocherkassk IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: ELEKTROMEKHANIKA in Russian No 11, Nov 85 (manuscript received 1 June 83) pp 47-49

Aleksandr Mikhaylovich Litvinenko, candidate of technical sciences, senior teacher, Voronezh Polytechnical Institute

[Abstract] Linear electrodynamic motors (LEM) are considered, the operating principle of which is based on the electrodynamic interaction of anti-parallel currents. These motors have a prospective use for the drive of manipulators of industrial robots. The active element of an LEM for translational motion is studied. It is demonstrated that: 1) The heat resistance of the active element (made of 11-micron thick aluminum foil in the experiments) of the LEM is determined by the permissible current density, by means of which burnout of the foil originates; 2) For 11-micron thick foil the permissible current is found to be from 300...150 A/mm^2, and a larger value belongs to foil with a smaller width; and 3) The dependence of the permissible current density on the foil width is approximated by a decreasing power function. Figures 1; references: 6 Russian.
[164-6415]

UDC 621.316.542:621.3.064.4

CALCULATION OF RESTORABILITY OF ELECTRIC STRENGTH OF EXPLOSIVE ARC-SUPPRESSION DEVICES

Novocherkassk IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: ELEKTROMEKHANIKA in Russian No 11, Nov 85 (manuscript received after completion 27 Jan 84) pp 100-104

Oleg Ivanovich Fursa, senior scientific-research worker, Scientific-Research Institute attached to Tomsk Polytechnical Institute; Vladimir Ivanovich Gotman, candidate of technical sciences, assistant professor, Tomsk Polytechnical Institute; Valeriy Leonidovich Korolkov, candidate of technical sciences, senior scientific-research worker, High-Voltage Scientific-Research Institute attached to Tomsk Polytechnical Institute; Garri Yakovlevich Shimkevich, junior research worker, High-Voltage Scientific-Research Institute attached to Tomsk Polytechnical Institute

[Abstract] Protection of high-power electrical generators and thyristor converters is a pressing and still unsolved problem because of the absence of fast-acting switching devices with increased breaking capacity. One of the most promising means for solution of this problem is considered, i.e., the creation of explosive arc-suppression devices (EASD), the operating principle of which is based on the use of the explosive energy of an explosive substance for switching off of the current (disconnection of contact system and suppression of arc). The possibility is established of determining the restorability of the electric strength of an EASD by Maur's equation, with an approximation of the arc parameters by the power functions of the resistance, and the final formulas are obtained for its calculation according to the results of standard tests. Figures 2; tables 2; references 6: 5 Russian, 1 Western.
[164-6415]

UDC 621.311:621.31.7

ERROR OF NUMERICAL METHOD OF DETERMINING QUALITY INDICATORS OF ELECTRIC ENERGY

Minsk IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: ENERGETIKA in Russian No 11, Nov 85 pp 22-26

V.S. Kakhanovich, candidate of technical sciences, assistant professor, Belorussian Polytechnic Institute, and A.S. Vershinin, engineer, Novopolotsk Polytechnic Institute

[Abstract] The error in determining the quality indicators of electric energy depends largely on the time discretization of voltage and current waveforms, the discretization step and thus the number N of instantaneous readings during one period being determined by the quadrature relations on a usually uniform grid. This applies specifically to calculation of effective

voltage and current from their discrete instantaneous readings. The relative error of an effective value calculated on this basis is found to depend on the harmonic content and thus on the waveform. In accordance with Kotelnikov's theorem, reconstruction of a discretized waveform will be error-free only when $K_m \leq \frac{1}{2}N$ (K_m - order of highest harmonic at cutoff frequency). For a waveform symmetric with respect to the angle (time) axis and thus free of even harmonics this condition becomes $K_m \leq \frac{1}{2}N - 1$. An error analysis on the basis of a harmonic analysis is demonstrated on a symmetric trapezoidal waveform, for which both ripple factor and relative error have been calculated and plotted as functions of the rise-time angle so that the error in determining the effective voltage or current of a flat waveform can be readily estimated for any discretization number N. Article was presented by Department of Computer Engineering at Novopolotsk Polytechnic Institute. Figures 3; references: 5 Russian.
[145-2415]

UDC [621.313.333.043.2:621.762.4].001.4

OPTIMIZATION OF GEOMETRY OF POWDER STATOR FOR ASYNCHRONOUS MOTOR WITH SCREENED POLES

Moscow ELEKTROTEKHNIKA in Russian No 11, Nov 85 (manuscript received 18 Dec 84) pp 16-18

P.Yu. Kaasik, doctor of technical sciences, professor; M.A. Goldman, and D.K. Stanikunas, candidates of technical sciences, and Yu. A. Dormidonov, engineer.

[Abstract] The use is considered of soft magnetic powder material in the construction of the magnetic circuit of a low-power electric motor, the particular value of which is saving electrical-sheet steel during production of asynchronous motors with shielded poles (AMSP). Because the performance of a motor deteriorates in the case of a simple replacement of an AMSP electrical-sheet steel stator by powder without change of its geometry, the problem arises during preservation of the overall external dimensions, of determining the geometrical dimensions of a powder stator such that the basic characteristics of the AMSP do not deteriorate. Two examples are given of optimized calculations of the geometrical factors involved: the thickness of the magnetic shunt, the width of the yoke, and one technical factor, the density of the powder stator. The optimum total is determined by variations of all the parameters. Figures 2; tables 2; references: 5 Russian.
[158-6415]

UDC 621.313.333

CLASSIFICATION OF DYNAMIC BRAKING SYSTEMS FOR ASYNCHRONOUS MOTORS

Novocherkassk IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: ELEKTROMEKHANIKA in Russian No 10, Oct 85 (manuscript received 21 Feb 85) pp 110-112

A. I. Tanatar, V. I. Durnev and V. A. Uzhelovskiy

[Abstract] This study represents the initial attempt to classify the entire variety of ways of connecting an asynchronous motor in the dynamic braking mode. The classification is arranged by type of motor, excitation methods, manner of excitation current flow through stator windings, manner of connection of rotor circuit resistances, type of resistances, type of rotor circuit rectifier, manner of connection of feedback rectifier in relation to rotor circuit resistors, manner of connection of independently excited rectifiers and feedback rectifiers, manner of flow of independent excitation and feedback current through stator windings, and number of stator phases through which excitation current, feedback current, and combined current flow. Figures 1; references: 12 Russian.
[6900/153]

UDC 621.385.833.2:534

PHOTOACOUSTIC SPECTROSCOPY OF OPTICALLY OPAQUE OBJECTS EMPLOYING PIEZOELECTRIC RECORDING

Moscow AKUSTICHESKIY ZHURNAL in Russian Vol 31, No 4, Jul-Aug 85 (manuscript received 5 Mar 84) pp 469-474

Yu. V. Gulyayev, A.I. Morozov and V. Yu. Rayevskiy, Institute of Electrical Engineering and Electronics, USSR Academy of Sciences

[Abstract] A class of optically opaque thermally thick objects with thickness comparable to the wave length of sound therein is examined. The photoacoustic effect recorded by a piezoelectric longitudinal bulk wave transducer is calculated. It is found that spectral investigations of objects are possible for values of βl (where β is the optical absorption coefficient and l is the thickness of the object) exceeding 10^5 cm^{-1} when certain relationships between the characteristic spatial scales of the problem of optoacoustic generation are satisfied. It is found that the object-transducer system exhibits acoustic resonances; a method is shown for calculating the resonant frequencies. The photoacoustic response is calculated for different types of mechanical boundary conditions. Figures 1; tables 1; references 8: 1 Russian, 7 Western.
[6900/149]

UDC 534.222

PARAMETRIC INTERACTION OF RANDOM AND REGULAR WAVES IN NONLINEAR MEDIUM WITHOUT DISPERSION

Moscow AKUSTICHESKIY ZHURNAL in Russian Vol 31, No 4, Jul-Aug 85 (manuscript received 5 Mar 84) pp 475-480

S. N. Gurbamov and N. V. Pronchamov-Rubchov, Gorkiy State University

[Abstract] This study presents a theoretical analysis of the interaction of a plane high frequency monochromatic wave with a non-one-dimensional low frequency noise field in a nonlinear medium without dispersion or attenuation. The evolution of the spectral composition of the nonlinear scattered wave is

examined considering the generation of higher harmonics of the high frequency regular signal using an assigned field approximation. An example is presented that illustrates the relationship between the strength of the scattered signal and the length of the nonlinear interaction path. The efficiency of generation of the noise field at the k-th harmonic of the regular signal is investigated. Scattered field generation is found to be more efficient at higher-numbered harmonics, which has been noted experimentally. References 11: 7 Russian, 4 Western.
[6900/149]

INVESTIGATION OF GaAs VERTICAL FIELD CONTROLLED FIELD PHOTO-TRANSISTORS. AMPLIFICATION MECHANISM AND PHOTOCURRENT KINETICS

Leningrad FIZIKA I TEKHNIKA POLUPROVODNIKOV in Russian Vol 19, No 10, Oct 85 (manuscript received 26 Mar 85) pp 1731-1735

M.S. Bogdanovich, L.A. Volkov, V. G. Danilchenko, V.I. Korolkov, N. R. Rakhimov, T. S. Tabarov and B. S. Yavich, Physical-Technical Institute imeni A. F. Ioffe, USSR Academy of Sciences

[Abstract] The electrical and photoelectric properties, and frequency and impulse responses, of gallium-arsenide vertical field controlled field phototransistors are investigated. The dark and light voltage-current characteristics, as well as speed and noise characteristics, of phototransistors based on weakly doped GaAs were studied. The results indicate that vertical field controlled phototransistors are better than most existing internal-gain photodetectors in terms of basic parameters and characteristics, and are very promising for fiber optic communications lines. The phototransistor structure investigated is also useful for building densely packed matrix detectors. Figures 7; references 5: 1 Russian, 4 Western.
[6900/141]

DISTANT ACTION EFFECT DURING MECHANICAL TREATMENT OF GALLIUM-ARSENIDE

Leningrad FIZIKA I TEKHNIKA POLUPROVODNIKOV in Russian Vol 19, No 10, Oct 85 (manuscript received 20 Feb 85) pp 1806-1809

B. I. Bednyy, S. N. Yershov and V. A. Panteleyev, Gorkiy Physical-Technical Research Institute

[Abstract] A remote action effect is detected in polishing epitaxial GaAs structures from the substrate side. The stationary full surface photoconductivity and photopotential of the GaAs film are investigated. The surface potential of the barrier in the epitaxial film is found to increase by 60-100 mV, and the spectral sensitivity is found to drop in the region of intrinsic absorption by factors of 1.5-2. The experimental findings indicate a change in the electrophysical properties of the epitaxial layer due to

mechanical working of the structure. The most probable cause for this change is migration of point defects from the disrupted layer, which correlates well with the data from other studies. Figures 2; references 16: 13 Russian, 3 Western.
[6900/141]

TRANSMISSION OF ELECTROMAGNETIC IMPULSE IN MAGNETOPOLARON SYSTEM

Leningrad FIZIKA I TEKHNIKA POLUPROVODNIKOV in Russian Vol 19, No 10, Oct 85 (manuscript received 12 Nov 84) pp 1874-1877

A. S. Kindyak and V. P. Gribkovskiy, Institute of Solid State and Semiconductor Physics, Belorussian SSR Academy of Sciences

[Abstract] This study demonstrates the possibility of soliton modes of ultrashort electromagnetic pulse propagation in semiconductors that reside in a homogeneous permanent magnetic field and exhibit parabolic dispersion of conductivity electrons because of their interaction with optical phonons. A system of equations is derived that describes the interaction of magnetopolarons with the electrical field created by ultrashort electromagnetic pulses. In order for soliton propagation modes of ultrashort pulses to be possible, the Landau levels must be nonequidistant, which is determined by the electron-phonon interactions. References: 7 Russian.
[6900/141]

UDC 535.417.2:537.876.23.001.24

OPTICAL RESONATOR FILLED WITH LONGITUDINALLY INHOMOGENEOUS LENS-LIKE MEDIUM

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 30, No 10, Oct 85 (manuscript received 16 Apr 84) pp 1895-1900

M. Patek and A. P. Khapalyuk

[Abstract] An equivalent resonator method is proposed for analyzing the parameters of the fundamental Gaussian mode of a resonator filled with a longitudinally inhomogeneous lens-like medium. The proposed method finds the parameters of a certain simple equivalent resonator (with two spherical mirrors and homogeneous filler) whose beams coincide with, or are close to, the beams of the initial complex resonators. The equivalent resonators are defined by finding the coordinates of the apices of its mirrors and their centers of curvature. It is found analytically that longitudinal inhomogeneity of the medium can be disregarded in resonators that are stable with respect to longitudinal movement of the internal lens, but must be taken into account in resonators that are sensitive to such movement. Figures 1; references 11: 9 Russian, 2 Western.
[6900/136]

UDC 621.391.63:519.25.001.5

AUTOCORRELATION INVESTIGATION OF AMBIGUOUS RECOVERY OF OPTICAL IMAGE

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 30, No 10, Oct 85 (manuscript received 29 Jun 84) pp 1975-1985

A. A. Demin and S. O. Noskov

[Abstract] Ambiguous recovery of an optical image from the autocorrelation function is analyzed theoretically in order to formulate features that allow the type of autocorrelation function to be used to determine possible ambiguities and distinctions (relationships) among solutions. The image is reconstructed by recovering the field distribution of the object from the intensity of the diffraction picture in the Fraunhofer zone. Given information, or the corresponding selection criteria, it is shown possible to recover the sought distribution with the required accuracy by performing an exhaustive search of a finite number of essential solutions of the autocorrelation equation obtained by one of the familiar methods. Figures 2; references 13: 11 Russian, 2 Western.
[6900/136]

UDC 621.373.826:778.38

APPLICATION OF HOLOGRAPHIC FILTERING IN ACOUSTOOPTICAL DEVICES

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 30, No 10, Oct 85 (manuscript received 4 Dec 84) pp 2027-2031

M. P. Vasilev and M. A. Vishnevskaya

[Abstract] This study demonstrates the theoretical and experimental possibility of compensating the space spectrum of the optical signal in acoustooptical devices by means of holography in order to reduce the parasitic background illumination occurring at the output of the acoustooptical modulator. A holographic filter is described that consists of a phase transmitting hologram recorded on LOI-2 silver halogen layers. The results indicate that holographic filtering can reduce parasitic illumination significantly, while increasing the size of the light spot, making it close to the theoretical value. The latter is important when light must be introduced into very small diaphragms, small light-sensitive areas, or very thin light guides. Figures 3; references 4: 3 Russian, 1 Western.
[6900/136]

UDC 621.376:534.001.5

LIMITING PARAMETERS OF BISMUTH GERMANATE-BASED ACOUSTOOPTICAL ELEMENTS FOR HIGH-RESOLUTION SPECTRUM ANALYZERS

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 30, No 10, Oct 85 (manuscript received 22 Dec 83) pp 2074-2075

V. V. Kucha, V. I. Mirgorodskiy, S. V. Peshin and A. T. Sobolev

[Abstract] An investigation is made of the physical constraints on the parameters of acoustooptical modulators in order to determine the limiting characteristics of devices employing such modulators. The working frequency band, frequency resolution, and dynamic range of bismuth germanate acousto-optical modulators are analyzed. The use of a mechanical modulator to modulate laser radiation in order to measure dynamic range is described. It is found that bismuth germanate modulators operating at approximately 400 MHz can provide a dynamic range of approximately 80 dB in the photo detection mode with accumulation time of approximately 100 μsec. Figures 1; references 8: 2 Russian, 6 Western.
[6900/136]

UDC 535.853.1-1

INFLUENCE OF UNSTEADINESS OF RADIATION FLUX ON MEASUREMENT ACCURACY IN INSTRUMENTS EMPLOYING SYNCHRONOUS SIGNAL DETECTION

Leningrad OPTIKO-MEKHANICHESKAYA PROMYSHLENNOST in Russian No 11, Nov 85 (manuscript received 3 Apr 85) pp 4-6

B. S. Vorobev, A. Ye. Stanevich and M. B. Rylkova

[Abstract] Spectral devices employing synchronous signal detection and photoelectric recording are examined. The influence of unsteadiness of the radiation flux on the radiation detector is investigated. Random error is noted that shifts the phase of the working signal due to the change in the ratios of the resistance and the reactance in the radiation detector circuit. The relationship between this error and the information coding method is investigated. Figures 1; references 9: 8 Russian, 1 Western.
[6900/159]

UDC 621.384.32

CHOICE OF NUMBER OF EMITTED PULSES IN DETECTION OF FLUCTUATING OPTICAL SIGNALS

Leningrad OPTIKO-MEKHANICHESKAYA PROMYSHLENNOST in Russian No 11, Nov 85 (manuscript received 3 Mar 85) pp 6-8

F. I. Khaytun

[Abstract] The change in the optimal number of emitted pulses in detecting fluctuating optical signals is investigated as a function of the degree of fluctuation of the signal. A distribution is analyzed that is typical for signal fluctuations caused by random Gaussian errors in orienting the optical axis of a radiator with a Gaussian radiation pattern toward a point object. It is found that the optimal number of pulses increases as the signal variation ratio increases and as the detection probability requirements become more stringent. If the number of pulses is less than optimal, significant energy losses can occur when the fluctuations are relatively strong; increasing the number of pulses beyond the optimal figure has comparatively little influence on the energy profiles. Figures 2; references: 2 Russian.
[6900/159]

UDC 771.537.521

INFLUENCE OF FORM OF SCATTERING INDEX OF ELEMENTARY VOLUME OF LIGHT-SCATTERING MEDIUM ON OPTICAL CHARACTERISTICS OF RADIATION FIELD

Leningrad OPTIKO-MEKHANICHESKAYA PROMYSHLENNOST in Russian No 11, Nov 85 (manuscript received 21 Dec 84) pp 1-4

V. I. Barkov, S. G. Grenishin and Ye. A. Alekseeva

[Abstract] The scattering index of an elementary volume of a light-scattering medium is investigated for different values of the asymmetry parameter in order to determine the influence of the form of the index on the optical characteristics of the output radiation field. The radiation fields are calculated for a model of a photographic layer that accounts for the basic factors that have the greatest influence on the formation of the light mode. It is found that complicating the analytical form of the scattering index in order to make its configuration closer to the form of the scattering index of real light scattering media produces no essential changes in the estimate of the optical characteristics of the radiation field exiting the medium. The main part in this estimate belongs to the asymmetry parameter of the scattering index, but not its configuration. Tables 2; references: 4 Russian.
[6900/159]

UDC 522.21.535.854

AST-1200 COMPOSITE-MIRROR ASTRONOMICAL TELESCOPE

Leningrad OPTIKO-MEKHANICHESKAYA PROMYSHLENNOST in Russian No 11, Nov 85 (manuscript received 11 Jan 85) pp 22-25

N. D. Ustinov, A. S. Vasilev, Yu. P. Vysotskiy, B. Ya. Gutnikov, I. I. Dukhopel, Ye. B. Evdokimov, V. I. Kryukov, M. Yu. Putilovskiy, N. V. Ryabova, N. V. Steshenko, V. V. Sychev, G. P. Tarasov and B. K. Chemodanov

[Abstract] The construction and design of the AST-1200 composite-mirror astronomical telescope, and some findings obtained during the summer of 1983, are examined. The telescope is made up of the optical system, the control system for the components of the composite main mirror, and an aiming and guiding system. The basic parameters of the optical system are tabulated. A photographic analysis of the operation of the telescope indicates that the three main factors that determine the image quality are the errors introduced by the optical system of the telescope, the atmospheric conditions during the observations, and the accuracy with which the images from the separate elements of the composite aperture of the telescope are aligned. Accuracy of control of the mirror elements of approximately 0.1" is achieved. Figures 4; references: 5 Western.
[6900/159]

UDC 620.179.112:681.7.026.3

INFLUENCE OF CHEMICAL-MECHANICAL SURFACE CLEANING OF OPTICAL DIELECTRICS ON SURFACE CHARGE STATE

Leningrad OPTIKO-MEKHANICHESKAYA PROMYSHLENNOST in Russian No 11, Nov 85 (manuscript received 6 Feb 85) pp 58-59

A. V. Kuznetsov and M. L. Klebanov

[Abstract] An assessment is made of the quality of preparation of glass substrates by measuring the tribocharge that occurs on dielectric surfaces as the result of mechanical cleaning. The relationship between the charge state of the surface and the dielectric material and cleaning method is investigated using six batches of samples, three of K8 glass and three of KU-1 quartz glass. The tribocharge value is investigated as a function of the duration of the surface sponging process. If the cleaning time exceeds 40 seconds, saturation occurs and continued sponging does not change the charge value. Once cleaning is stopped, the surface charge drops off exponentially, at a rate depending upon the specimen material. The sign of the tribocharge depends upon the chemical cleaning technology. The data can be used for developing a non-destructive method for objective quality control of optical surface cleaning. Figures 2; tables 1; references 4: 1 Russian, 3 Western.
[6900/159]

UDC 621.378

ENERGY CHARACTERISTICS AND STRUCTURE OF CONFINED LIGHT BEAMS IN TWO-PASS AMPLIFIER WITH PHASE-CONJUGATION MIRROR

Gorkiy IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOFIZIKA in Russian Vol 28, No 10, Oct 85 (manuscript received 14 Jun 84) pp 1256-1265

A. A. Betin, N. D. Milovskiy and N. Yu. Rosov, Gorkiy State University

[Abstract] An investigation is made of the amplification of counter-propagating light beams with quasi-planar or quasi-spherical wave front in a two-level active medium with uniformly broadened luminescence line with and without wave interference. An amplifier was examined whose length is much shorter than the diffraction length of the input beams. The gain and efficiency of the amplifier are calculated as a function of its parameters, and of the structure and power of the input beam. The theoretical limits of applicability associated with the presence of a diaphragm that limits the transverse dimensions of the active medium are determined. The constraints imposed on phase conjugation accuracy by the nonlinear nature of the gain are found. As long as the field frequency is in exact resonance with the transition frequency of the active medium, the direct-beam approximation provides a good description of all operating modes of a short two-pass amplifier, as well as those of a fairly long amplifier (with some constraints). Figures 8; references: 7 Russian.
[6900/151]

UDC 621.382.8

IMPLICATORY COMPONENT BASE FOR DIGITAL LSI CIRCUITS

Moscow MIKROELEKTRONIKA in Russian Vol 14, No 3, May-Jun 85 (manuscript received 5 Oct 83) pp 203-209

S. O. Mkrtchyan, Yerevan Polytechnical Institute imeni K. Marx

[Abstract] The use of the logical implication function as the basis function for synthesizing digital LSI circuits is investigated. The logic element that implements the implication truth table is called an implicator. Although the implication operation by itself does not comprise a functionally complete system, the implication function expresses significantly more switching functions of two variables than does disjunction or conjunction. Examples of combination and series logic circuits of digital devices based on implicators are examined. Various electrical circuits of implicators based on bipolar and MOS transistors are analyzed. Figures 4; references: 4 Russian.
[6900/150]

UDC 621.374.3:621.382

SPECIAL FEATURES OF DESIGNING DIGITAL LSI ELEMENTS EMPLOYING AND-OR-NOR BINARY-TERNARY MEMORY ELEMENTS

Moscow MIKROELEKTRONIKA in Russian Vol 14, No 3, May-Jun 85 (manuscript received 16 Mar 84) pp 210-217

M. V. Luchko, Lvov Trade and Economics Institute

[Abstract] This study addresses the design of asynchronous digital circuits with memory employing AND-OR-NOR logic elements. Some formal approaches are presented for designing digital LSI circuits with memory employing a synchronous binary-ternary memory elements. The description of a binary-ternary T-flip-flop as in a synchronous finite automaton is described. The use of RSF flip-flops and RSL flip-flops is described. The approaches presented can be used in conjunction with other findings to form a general procedure for designing optimal asynchronous series circuits using binary-ternary memory elements. Figures 1; tables 5; references 13: 11 Russian, 2 Western.
[6900/150]

UDC 621.396

FORMATION OF SPATIALLY DISTRIBUTED PHYSICAL STRUCTURE OF INTEGRATED CIRCUITS AND PRINCIPLES OF OPTIMIZATION

Moscow MIKROELEKTRONIKA in Russian Vol 14, No 3, May-Jun 85 (manuscript received 9 Feb 84) pp 218-221

V. N. Panasyuk, V. G. Mokerov and S. M. Kuzin

[Abstract] A general methodology is presented for processing information on the distribution of the physical structure of integrated circuits. A scheme for optimizing the technological IC fabrication process based on analyzing response surfaces is presented, in which the critical response surfaces are isolated and optimized, the resulting response surfaces of the electro-physical parameters of the IC are calculated, the analytical data is compared with the experimental findings, and the norms and electro-physical model of the IC are refined. The basic principles are formulated for analyzing information on spatially distributed parameters of the physical structure and the materials in order to optimize technological processes. Figures 4; references: 3 Western.
[6900/150]

POSSIBILITY OF SUBMILLIMETER NEGATIVE DIFFERENTIAL CONDUCTIVITY DURING INTER-VALLEY TRANSFER OF HOT ELECTRONS IN STRONG ELECTRICAL FIELDS

Leningrad FIZIKA I TEKHNIKA POLUPROVODNIKOV in Russian Vol 19, No 10, Oct 85 (manuscript received 17 Jul 84) pp 1810-1821

A. A. Andronov and G. E. Deamukashvili, Tbilisi State University

[Abstract] The singularities in differential conductivity and the noise spectrum at high frequencies during inter-valley transfer are investigated simultaneously for different gaps between the upper and lower valleys and ballistic heating of the electrons. A two-valley model of inter-valley transfer is employed assuming no scattering by phonons in the lower valley. It is shown that two groups of electrons with different heating (transit) times are formed in the lower valley, and that the distribution of the electrons in the lower valley is inverted longitudinally and transversely with respect to the electrical fields. Changing the relationship between the transit times of the two groups of electrons in the lower valley changes the frequency behavior of the differential conductivity. The analysis opens up a number of possibilities for moving systems employing inter-valley transfer into the submillimeter region. Figures 7; references 15: 6 Russian, 9 Western.
[6900/141]

UDC 534.232

UTILIZATION OF GAS HYDRAULIC ACCUMULATION OF ENERGY TO EMIT STRONG ACOUSTIC SIGNALS

Moscow AKUSTICHESKIY ZHURNAL in Russian Vol 31, No 4, Jul-Aug 85 (manuscript received 20 Feb 84) pp 560-562

S. P. Ryzhakov, Acoustic Institute imeni N. N. Andreyev, USSR Academy of Sciences

[Abstract] A method is proposed for analyzing and designing hydraulic acoustic radiators, employing gas hydraulic energy accumulation, for emitting powerful low-frequency acoustic signals. The device incorporates a pump that pumps a working liquid into the cavity of an accumulator; the gas in the cavity is compressed, increasing its pressure. After the gas hydraulic accumulator has been charged, it is connected to a radiator. The pressure of the liquid in the cavity begins to oscillate when a modulator is driven by an electromechanical transducer; these oscillations act upon a piston that drives a radiating piston. Formulas are derived for the aperture area of the modulator, the emitted power, and efficiency. Calculations show that gas hydraulic accumulators with volume of 100-300 ℓ are capable of emitting an acoustic signal with power of several tens of milowatts for 10-20 sec. The accumulators can be charged in a few minutes. Figures 2; references 5: 4 Russian, 1 Western.
[6900/149]

UDC 534.28

SPATIAL COHERENCE AND FIELD INTENSITY DISTRIBUTION IN UNDERWATER ACOUSTIC CHANNEL

Moscow AKUSTICHESKIY ZHURNAL in Russian Vol 31, No 4, Jul-Aug 85 (manuscript received 27 Feb 84) pp 417-422

S. S. Abdullayev and B. A. Niyazov, Tashkent State University

[Abstract] An asymptotic method is proposed for calculating the spatial correlation function of the acoustic field in an ocean with arbitrary

smoothly-varying vertical sound velocity profiles. The spatial correlation function and vertical distribution of the average sound intensity in a horizontally homogeneous ocean at a sufficiently long distance from an elongated spatially noncoherent source is examined. The correlation properties and vertical distribution of the average field intensity determined theoretically are found to be independent of the location of the source. The behavior of the spatial correlation function is investigated for different distances between observation points. The findings can be extended to the case of an ocean with a soft bottom. References 11: 9 Russian, 2 Western.
[6900/149]

UDC 534.28

ATTENUATION OF AVERAGE FIELD DURING WAVE GUIDE SOUND PROPAGATION IN OCEAN WITH ROUGH SURFACE

Moscow AKUSTICHESKIY ZHURNAL in Russian Vol 31, No 4, Jul-Aug 85 (manuscript received 29 Apr 84) pp 511-512

D. I. Abrosimov, L. S. Dolin and A. G. Nechayev, Institute of Applied Physics, USSR Academy of Sciences

[Abstract] The attenuation coefficients of the coherent components of normal waves propagating in an underwater acoustic channel are investigated. A procedure is derived for calculating the power carried away by the stochastic component of the field and the attenuation factors. The frequency behavior of the attenuation coefficient is analyzed; those coefficients are found to be related more intrinsically with frequency and wind speed for lower modes. Figures 1; references 5: 3 Russian, 2 Western.
[6900/149]

UDC 551.463

OPTIMIZATION OF DIRECTIVITY OF HYDROACOUSTIC ANTENNAS CONSIDERING RANDOM CHANGES IN PROPAGATION MEDIUM

Moscow AKUSTICHESKIY ZHURNAL in Russian Vol 31, No 4, Jul-Aug 85 (manuscript received 25 Oct 84 after revision) pp 558-560

G. A. Posmnov, Institute of Oceanology imeni P. P. Shirshov, USSR Academy of Sciences

[Abstract] This study analyzes the problem of optimizing the parameters of a receiving antenna array for the case in which the signal field is known exactly, and the interference field, which determined by the dynamic noise of the ocean, is a function of a single random parameter--wind speed. The signal is processed by means of a standard receiver in which the signals from the antenna elements are summed with weights that need to be optimized. The summed

signal is squared and accumulated, and detection is done using the Neumann-Pearson criterion. The optimal array is found to provide a significant advantage over a uniform array; the gain in efficiency provided by an adaptive array over the optimal array is found to be small. It is concluded that antennas with fixed optimal parameters are feasible in the absence of spot interference even when the noise statistics vary over time. Tables 4; references 6: 5 Russian, 1 Western.
[6900/149]

UDC 534.222

EXPERIMENTAL INVESTIGATION OF PROPAGATION OF NONLINEAR SOUND BEAMS IN FREE SPACE

Moscow AKUSTICHESKIY ZHURNAL in Russian Vol 31, No 4, Jul-Aug 85 (manuscript received 20 Apr 84) pp 423-428

V. G. Andreyev, A. A. Karabumov and O. V. Rudenko, Moscow State University

[Abstract] The behavior of diffracting beams of sound waves of finite amplitude is investigated experimentally, and computer analysis results are compared with experimental findings. The conditions that prevent the occurrence of phase shifts between harmonics due to other factors, such as wave guide dispersion, gas bubbles in the water, etc., are examined. The relationship between the amplitudes and durations of the compression phase and refraction phase, characterizing the asymmetry of the wave profile, are measured. The conclusions regarding the qualitative regularities underlying the generation of harmonics in nonlinear sound beams are confirmed experimentally. Figures 6; tables 1; references 7: 5 Russian, 2 Western.
[6900/149]

UDC 534.26

DIFFRACTION OF PLANE SOUND WAVE ON SEMI-INFINITE THREE-LAYER PLATE IN LIQUID

Moscow AKUSTICHESKIY ZHURNAL in Russian Vol 31, No 4, Jul-Aug 85 (manuscript received 23 Jan 84) pp 451-458

V.A. Veshev, Leningrad State University, Physics Department, Physics Research Institute

[Abstract] The diffraction of sound waves on a semi-infinite three-layer plate in a liquid is investigated theoretically. A thin elastic semi-infinite plate coated on both sides with a uniform viscoelastic layer is submerged in an ideal compressible liquid, with the plate exhibiting infinite rigidity with respect to longitudinal movements, and capable only of flexural oscillations described by Kirchoff's equation. Numerical calculation by computer for a number of parameter values is described. The role of the

diffraction field in the overall wave picture is found to be significant in the shadow zone; the relative contribution of the diffraction field becomes greater than that of the departed wave field as the frequency increases, due to the strong drop in the intensity of the departed wave at high frequencies. Figures 5; tables 1; references 8: 7 Russian, 1 Western.
[6900/149]

UDC 534.833

COMPENSATION OF SOUND FIELD EMITTED BY THREE-LAYER CONSTRUCTION

Moscow AKUSTICHESKIY ZHURNAL in Russian Vol 31, No 4, Jul-Aug 85 (manuscript received 16 Jan 84) pp 464-468

A. I. Vyalyshev and B. D. Tarmakovskiy, Acoustics Institute imeni N. N. Andreyev, USSR Academy of Sciences

[Abstract] Compensation of the acoustic field created by a three-layer plane construction with exciting and compensating forces applied to different planes is investigated; stated differently, the problem is one of active sound isolation of a plate through which a sound wave emitted by another plate passes. The three-layer construction consists of two thin infinite plates residing in the planes $z = 0$ and $z = -h$ of a cylindrical coordinate system. The angular distribution of the drop in sound pressure is found as a function of the wave distance between the planes and the sources. This reduction is due to the change in the radiation resistance for a plate lying in the $z = -h$ plane under the influence of the acoustic field created by the external plate. Figures 3; references: 5 Russian.
[6900/149]

UDC [621.335:625.2.012.858.538.65]:621.313.12-12

WINDING OF FULL-SCALE SUPERCONDUCTING TRANSPORTATION MAGNETS

Novocherkassk IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: ELEKTROMEKHANIKA in Russian No 8, Aug 85 (manuscript received 24 May 84 after revision) pp 89-93

V.I. Omelyanenko, V. F. Bolyukh and S. A. Sergeyev

[Abstract] This study investigates the fabrication of superconducting magnets for use in magnetically-suspended ground transportation systems. One of the important factors that determines the mechanical stresses in such magnets is the amount of tension on the wire when the magnet is wound. The causes for irregular tension on the winding wire are investigated, and preventive means are found. The theoretical results were incorporated in the winding scheme used for the KhPI-101 superconducting core, which is designed as an elliptical octagon with dimensions of 1 x 0.3 m. Testing of the magnet confirmed the validity of the technological approaches employed. Figures 3; references 6: 3 Russian, 3 Western.
[6900/148]

UDC 538.31.001.2

ALTERNATING CURRENT SYSTEM FOR LEVITATION AND TRACTION

Novocherkassk IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: ELEKTROMEKHANIKA in Russian No 11, Nov 85 (manuscript received after completion 4 June 84) pp 40-47

Andrey Valeryanovich Bayko, junior research worker, and Valeriy Mikhaylovich Kochetkov, candidate of physical-mathematical sciences, senior scientific-research worker, Leningrad Institute of Railroad Transport Engineers

[Abstract] Magnetic interaction between a moving electromagnet and the eddy current field induced by it forms the principle of electrodynamic levitation for transport systems. The most complex and expensive part for such systems is the traction device--ordinarily this is a linear synchronous motor with a three-phase system of coils along the path of movement. A

version of the traction device is considered--a linear asynchronous motor of a special type, not requiring installation of track coils. In essence such a motor does not require a separate levitation system, and is a complex device providing traction and noncontact suspension. The possibility is shown of technical achievement of the proposed complex based on the use of the hyperconductive effect. Figures 6; references 9: 6 Russian, 3 Western. [164-6415]

NEW ACTIVITIES, MISCELLANEOUS

DETERMINE HUMAN FACTOR

Moscow AVTOMATIKA, TELEMEKHANIKA I SVYAZ in Russian No 11, 1985 pp 17-20

B. Tsikovich

[Abstract] Less than a year is left before the start-up of the first stage of the Klaypedsk railroad USSR-GDR ferry crossing. A large amount of work is in prospect--to construct a new station near the port, a hump marshalling yard, and to reconstruct several operating stations. This construction has given a strong impulse to the growth of almost all branches of the economy of the Shyaulyaysk Division of the Baltic road, in the zone of which the ferry crossing is located. The paper considers the problems to be solved in the new construction and how personnel will be involved with them. Various individuals are identified (with photographs) and their particular tasks are described.
[140-6415]

/9716
CSO: 1860

END